Dental Digest

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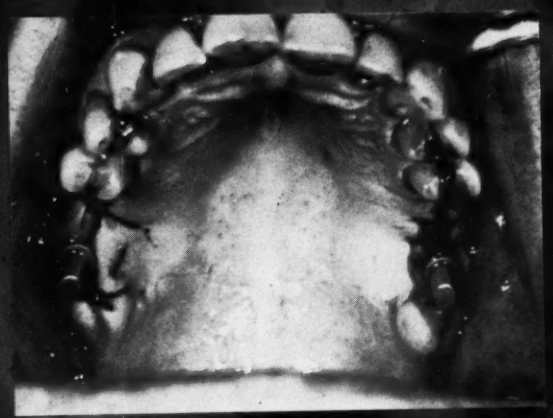

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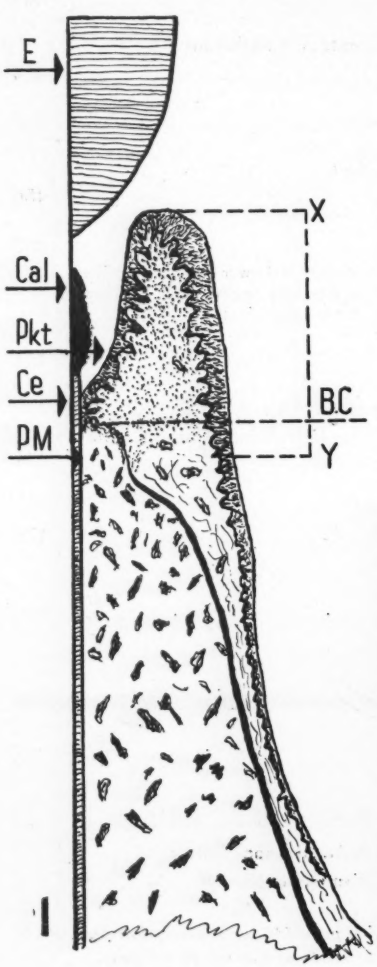
Problems and Therapeutics in the Management of PERIODONTAL DISEASE: *Part One*

THOMAS E. PROSSER, D.D.S., East St. Louis, Illinois

DIGEST

This three-part article presents for the general practitioner the clinical aspects of periodontal disease. Types of periodontitis are illustrated and therapy to be applied in each case is outlined.



Factors in Etiology

Numerous contradictory viewpoints on the etiology and pathogenesis of periodontal disease are found in dental literature. The following are some of the theories currently favored:

1. The disease can be attributed to purely local conditions within the oral cavity such as poor hygiene, calculus, occlusal trauma, and imperfect restorations.

2. The disease is a reflection in the oral cavity of a general body disorder, such as a dietary imbalance, endocrine disturbances, blood dyscrasias, and emotional or psychosomatic disturbances.

3. The disease is a result of both local and systemic disorders.

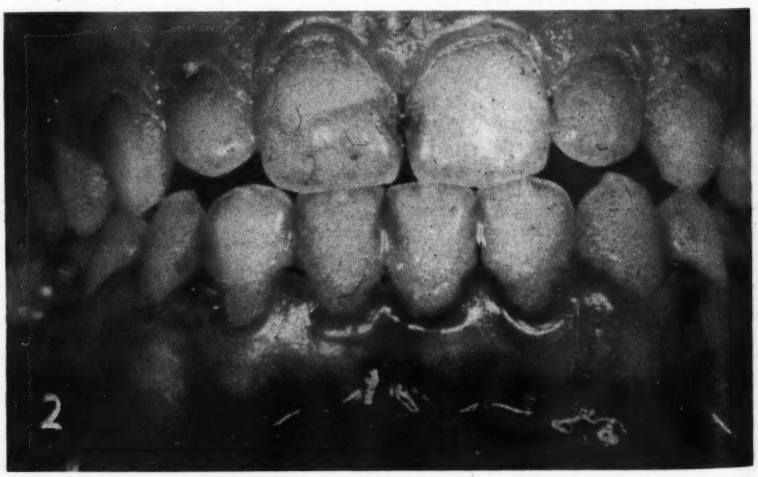
Unsolved Probelms—Many of the problems concerning periodontal disease that challenged the early practitioner, are still a challenge today.

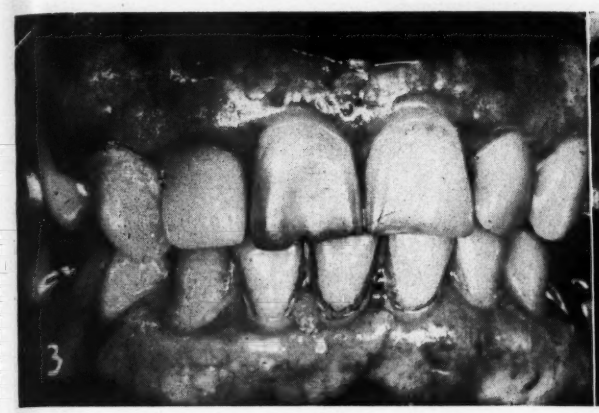
Further Study Required—A broader knowledge of general medicine and pathology and a detailed knowledge of oral pathology by the dentist are needed to stimulate interest in research, both clinical and laboratory, for a solution of this problem.

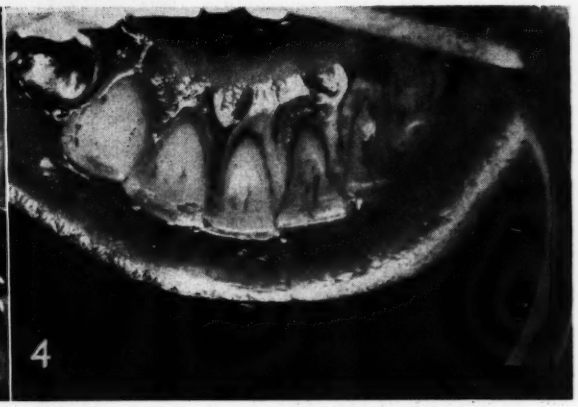
Patient Viewed as an Entity—Failure to observe and record clinical, x-ray and laboratory findings of the patient as a whole, and correlate these findings into a workable diagnosis may be the cause of failure to solve periodontal problems.

General Concept of Biochemical Changes Important—It is probably not important that every periodontist have a detailed knowledge of all the biochemical changes in disease, but it is important to have a working concept of these processes.[1] The periodontist must heed the growing application of biochemistry to etiology and treatment, for through the under-

[1]Nuckolls, James; Dienstein, Benjamin; Bell, Dickson G.; and Rule, Robert W. Jr.: The Periodontal Lesion. The Development of the Lesion and Establishment and Treatment of the Periodontal Pocket, J. Periodont 1:8 (Jan.) 1950.







standing of basic cellular responses to metabolic variations a rational approach to pathogenesis and therapy of the disease process can be formulated.[2]

General Factors in Management

Referring to the three etiologic theories mentioned, it is posible that all are correct. To eliminate as much hypothetical material as possible, and minimize confusion in the problem of management it is taken for granted that all dentists use the primary instruments of diagnosis; namely, good study casts and good x-rays. The method of taking histories, of diet analyses, and laboratory tests, is left to the individual dentist.

Periodontal Problems

Periodontitis Simplex—In this type (1) gingival inflammation is clinically conspicuous, (2) the pockets tend to develop in a broad and shallow manner, and (3) disease progress is slow. Increased mobility of the tooth in its alveolus is relatively a late sign. Essentially the condition is a progressive gingivitis.[3]

Figure 1—Periodontitis. E, enamel, Cal, calculus. Pkt, pocket. Ce, cementum. Pm, periodontal membrane. In the area x to y an inflammatory process exists. The alveolar crest is in a state of decalcification due to the accumulation of lactic acid. The pH of the tissue has dropped from 7.0 to about 6.5. The oral epithelium has proliferated apically to form the lining of the pocket. Upon the general condition of the patient, his attitude, and the location and depth of the pockets will determine the therapeutic procedure.

Figure 2—In a male patient, aged 20, with no medical history there is a classical picture of periodontitis simplex, shallow pockets, gingival inflammation, boggy and edematous tissue about the mandibular incisors, and general poor hygiene. At this

stage it is possible for the condition to terminate into a Vincent's or necrotic gingivitis. Procedure in this type is mild debridement, massage, 600,000 units of penicillin injected about the gingival tissues, and maintenance of apposition for 15 minutes. The edema usually disappears in 24 hours, and subgingival curettage can be carried out with little difficulty.

Figures 3, 4 *and* 5—In a woman

[2]Nuckolls, James; Dienstein, Benjamin; Bell, Dickson G.; and Rule, Robert W., Jr.: The Periodontal Lesion. The Development of the Lesion and Establishment and Treatment of the Periodontal Pocket, J. Periodont. **1**:7 (Jan.) 1950.

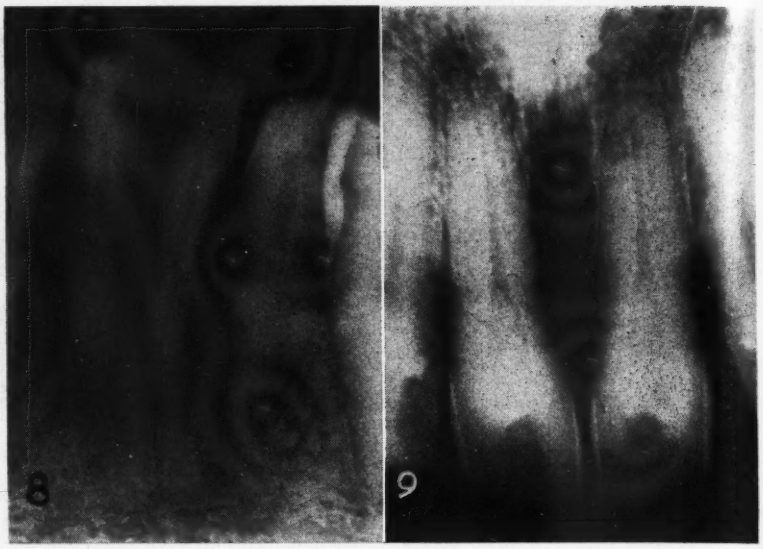
[3]Box, Harold K.: Concerning the Pathogenesis of Periodontal Disease, J. Periodont. **19**:11 (Jan.) 1948.

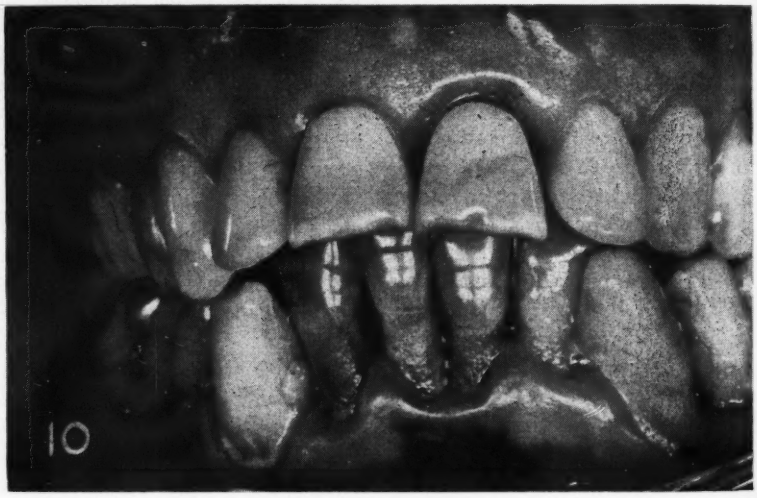
patient, aged 50, with periodontitis simplex the only important medical history was a hysterectomy five years previously. Note the general poor hygiene, purulent discharge, and pockets about 4 millimeters deep. Note that the interproximal alveolar crest has a cortical cap which is highly desirable. Procedure: subgingival curettage and a reduction of pockets with trichloracetic packs.

Figures 6, 7, 8 *and* 9—This patient, a woman aged 45, was probably a pre-adolescent mild hypothyroid. The irregularity of the teeth is not due to pathologic drifting but to the osseous architecture of the arches. This might be termed a mixed periodontitis. Note the loss of many teeth and general poor hygiene, shallow pockets, and an apparent tight relation of periodontal membrane with bone and tooth.

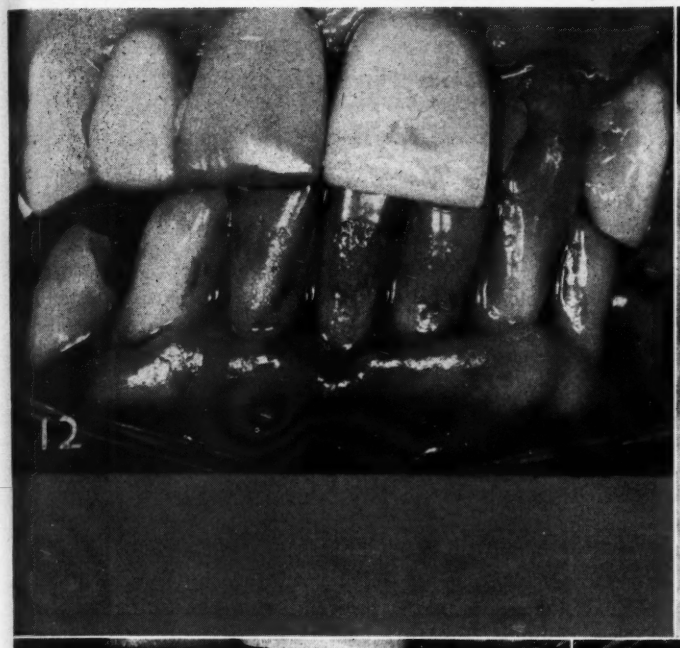
Figures 10 *and* 11—In a woman patient, aged 52, a hysterectomy due to malignancy had been performed ten years previously. This is a case of periodontitis simplex. Note the boggy gingival tissue about the mandibular incisors with accretions on the teeth. There is a slight resorption of the alveolar crest about most of the teeth but no pockets. This is a Class II malocclusion with an elevation of the mandibular incisors. The occupation of this patient will not permit her to wear a bite plane which would greatly improve her periodontal condition.

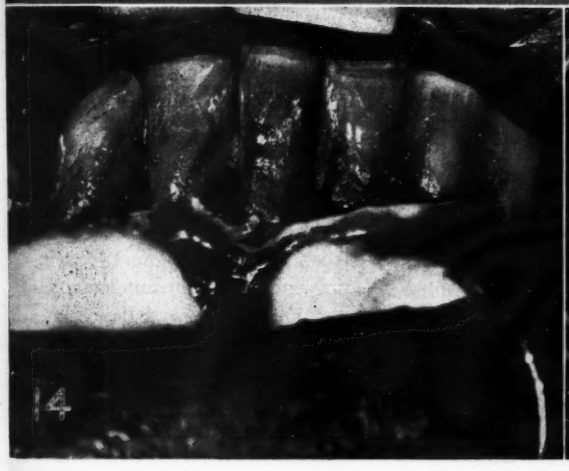
Figures 12, 13, 14 *and* 15—The woman patient in this case, aged 48, had a negative medical history with two exceptions, an allergy and a rather severe chronic sinusitis. She had required much prosthetic service and her hygiene had not been good. Note the boggy and edematous gingival tissue with broad pockets about 5 millimeters deep. Therapeutic procedure: subgingival curettage and complete reduction of pockets with trichloracetic packs. Healing was slow until the diet was supplemented with high potency vitamins. She wears a removable splint from bicuspid to bicuspid.





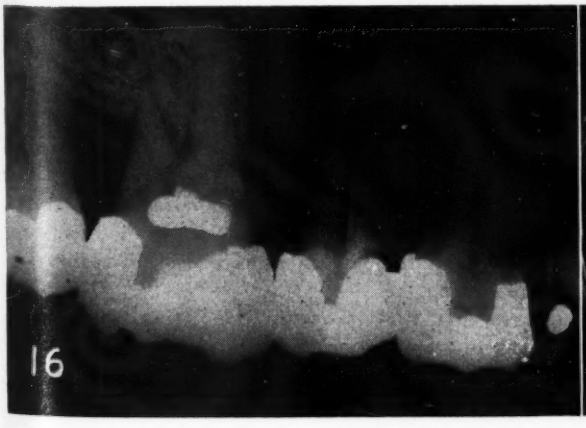
Technique for Use of Trichloracetic Packs—(1) Trichloracetic acid crystals are dissolved in eugenol to make a 70 per cent solution. One ounce is usually prepared at a time. (2) The area to be treated is walled off with cotton rolls and the saliva ejector is placed in the mouth. Pledgets of dry cotton are packed into the interproximal spaces. (3) The trichloracetic acid is applied to the cotton with a small dropper using extreme care to avoid other tissues. These packs are left in place about ten minutes. (4) The packs are removed. The cotton rolls are removed and the mouth is flushed with water. (5) The patient is told that some tissue will slough off in about two days. Application should not be made more than once a week, and this is continued until the pocket has been completely reduced. (6) The procedure is extremely effective in soft edematous tissue, but not so effective on

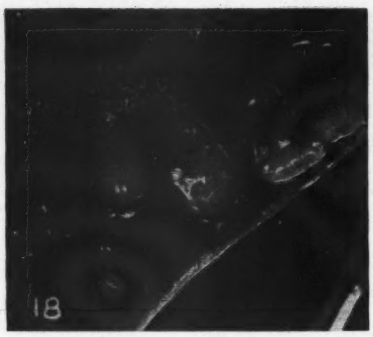




the heavy fibrous tissue, such as that found on the palatal gingiva about the molars. (7) To improve the gingival architectures after the pocket has been reduced to the desired depth, a stiff pack of Ward's surgical cement is occasionally applied and allowed to remain for five days.

Figures 16, 17 *and* 18—The result





is shown of trichloracetic pack therapy in the posterior maxillary arch.
(End of Part One)

524 *North 18th Street*

Hyperventilation Syndrome: Clinical Physiologic Observations

BERNARD I. LEWIS, M.D., Iowa City

Summary

Hyperventilation syndromes are common and most often follow a chronic course with periodic acute exacerbations. An analysis of 150 consecutive cases emphasizes the subtle ability of the chronic syndrome to stimulate serious organic disease. Etiologic factors may be organic or psychogenic or both.

Initial Pathogenic Step—Regardless of the precipitating process, the initial pathogenic step is sustained overbreathing. The resultant reduction in arterial carbon dioxide tension induces diffuse biochemical, neurovascular, and neuromuscular changes which tend to evoke an emotional response of fear and apprehension that prolongs the overbreathing and contributes to the total symptom pattern. This fear reaction, moreover, aids in the establishment of a chronic cyclic process.

Diagnostic Clues—The presenting symptom pattern most often implicates the cardiovascular system. Most of the other body systems may be involved with varying degrees of prominence and frequency, particularly the central nervous system. Peripheral and perioral paresthesias are the most consistent symptoms, and respiratory dysfunction is the commonest sign. These are seldom prominent features, however, and must be sought out.

Possible Results of Prolonged Conditioning—Recent studies in cardiopulmonary laboratories have indicated that hyperventilators, possibly as the result of prolonged conditioning, seem to have a more "efficient" level of ventilatory function that enables them easily and rapidly to reduce profoundly their arterial carbon dioxide tension.

Apparent Difficulty in Adjustment—Hyperventilators, however, do not appear able to adjust to the sequelae of these rapid changes in carbon dioxide tension, at least insofar as their cardiovascular apparatus and acid-base balance mechanisms are concerned. The full significance of these phenomena is not clear and additional study is indicated.

Adapted from *Postgraduate Medicine* **21**:271 (March) 1957.

Cortisone Complications

It is important to remember that persons who have received corticotropin or the adrenal steroids may experience severe complications after surgery. Whenever a patient is treated with cortisone or related compounds he should be told what it is and warned of possible dangers.

Prior to operation, patients should be questioned about past medication. Even when they do not know the drug by name, the cost of the pills (in case of the steroid hormones) will remain in their memory. Because there is no adequate way of predicting which patient previously treated with corticotropin or cortisone, may develop adrenal insufficiency at time of surgery, it is necessary to evolve a plan that will cover all eventualities.

The problem patients can be divided into three types:

(1) Patients who have received corticotropin or adrenal cortical hormone up to the day of operation. They should be carried through operation on increased intramuscular or intravenous doses of the steroid hormones and then gradually returned to the preoperative doses.

(2) Patients who have received adrenal corticoids within a month of operation and who during the month prior to operation have had a stressful illness. Here again intramuscular administration of cortisone is indicated in doses of about 200 milligrams on the day before and the day of operation and in gradually diminishing doses during the first six or seven postoperative days. The exact dose and the speed with which the drug is stopped will depend on the clinical course. In these first two groups the complications of steroid therapy must be watched with great care.

(3) Patients who have received corticotropin or adrenal steroids one to six months before operation. In these patients the possibility of adrenal insufficiency and shock should be suspected during operation and for 10 to 12 hours thereafter. If signs of insufficiency occur, hydrocortisone should be given intravenously at once and then followed with intramuscular injections of cortisone if necessary.

Seigle, S.P.: Complications Associated with Adrenal Steroid Therapy, Connecticut M. J. **20**:101-103 (February) 1956.

LIVING OSTEOLOGY

of Interest to the Dentist:

Part One

MELVIN G. HENNINGSEN, D.D.S., Hayward, California

DIGEST

Knowledge from various arts, sciences, and professions is constantly being incorporated into the practice of dentistry. New information is evaluated and either rejected as not being applicable or eventually accepted as having a place in the care of the oral tissues. Treatments and methods of practice in all professions are undergoing changes and the practitioner should be aware of some of this newer knowledge. This article presents some of the most recent concepts and relates them to practical aspects in dentistry.

Motion Essential to Function

Everything undergoes change. Motion is everywhere, but much of it is only observable microscopically or submicroscopically. The first requisite of life is energy or motion. Motion with a purpose is essential to normal function. In addition, there must be harmony of function between the various tissues and organs so that the body may work as an efficient unit and successfully exist in its environment.

Concept of Human Structure as an Entity

Since the care of the oral structures comes under the influence of dentistry it is important that the practitioner in this branch of the healing arts give serious consideration to the tissues coming within its sphere. The significance of dentistry can extend beyond the boundaries of the region labeled oral cavity. Distant areas can be improved or altered by conditions in the mouth. The way a dentist treats the oral tissues can have considerable effect on the overall result of body care aimed at the maintenance of harmony of function and the preservation of health.

Component Parts of Body Inseparable—It is possible to write or talk about the mouth and other tissues such as gastrointestinal tract, circulatory system, endocrine system as separate entities. The isolation of body parts, however, can only be done verbally or by writing about them since during life they are inseparable and function as a unit. Dentists should not think or speak of the mouth as an anatomic area separate from the rest of the body. Dentists consider the tissues as a whole: bone, nerve, facia, membranes, blood, endocrine, cerebrospinal fluid all functioning as a unit at a given moment in a body-mind-intellect-emotions-environment concept and visualize dynamic processes constantly changing in time-space relationships. Actually the dentist is not treating the identical patient today who was treated yesterday.

Changing Nature of Process—When the patient is visualized microscopically he is seen not as a person with a label of some disease, but rather as a series of processes continuing within his body. In other words, a series of individual persons with the same name and changing from moment to moment are being treated. Jones at 8 a.m. after breakfast is not identical in all respects with Jones before breakfast. He has, for example, begun to absorb and receive nourishment from protein, calcium, vitamins, and minerals; a few hundred blood cells have probably been formed; his beard may be .002 of an inch longer and a thousand or more bio-electro-physico-chemical changes of which there is little knowledge on the macroscopic level of evaluation may have occurred.

Influencing Processes—The dentist tends to think the patient is the same because he is visualized macroscopically. The nervous system is not capable of observing him on the microscopic or submicroscopic levels of abstraction as a mass of flying electrons. It is possible, however, to be conscious that changes are taking place and to recognize some of the changing factors of the patient's make-up. It is possible to think in terms of treating or influencing processes, constantly changing series of *events*, rather than to think in terms of a static text book definition of some condition with a label. What is said or written about it is not the same as the event occurring within the patient at a given time.

Written or Spoken Word Static Language Symbol—What is said or written applies only to the instant being considered because by the time the words are spoken a whole new series of microscopic changes have transpired.

Environmental Factors that Influence Health—One of the problems in the practice of dentistry is to learn to evaluate some of the processes within the patient which can have a bearing on oral health. As more knowledge is accumulated many influencing factors are discovered that

1. ***Base of young skull. Note that the occipital squama has been moved to the left and considerably molded. Part of the motivation has come from the posterior end of the right condylar part rotating the occipital squama about a vertical axis. In so moving, the occipital squama overrides the left parietal. Opisthion and inion are to the left and the lateral angle of the occiput is posterior on that side. The right parietal is flattened. The anteroposterior compression is on the right and the mediolateral crowding against the temporal is on the left. The long axis of the foramen magnum is oblique. The alae of the vomer may be seen moved to the left midline.***

are not within the patient, but which can affect him. Environment, marital problems, adverse radio news, shocking newspaper headlines, depressing motion pictures or television programs, dislike of his occupation and other emotional stress stimuli can all play a role.

Distant Disturbances of Body Reflected in the Mouth—Diseases of the oral cavity are prone to be considered as disturbances purely local to the mouth. Dental tissues are often identified as static entities and because of this dentistry is frequently thought to be largely a professional art of mechanical skills. This viewpoint is no longer so prevalent. In terms of daily practice it is necessary to be aware that disturbances in other parts of the body can be reflected in the condition of the mouth, and vice versa.

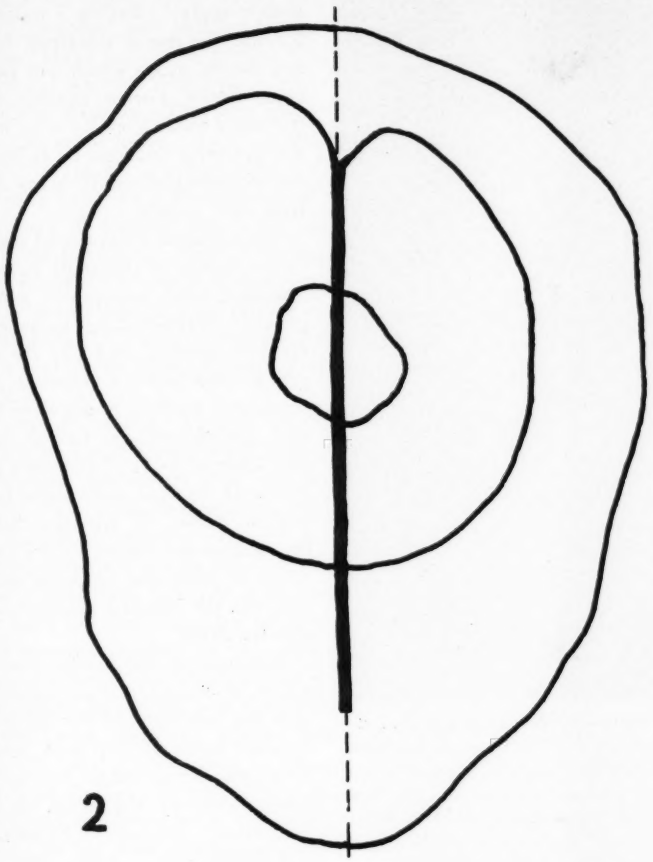
Tissue Integrity Factors Interactive—The integrity of the oral tissues is known to be dependent upon the proper functioning of the gastrointestinal, endocrine, circulatory, and nervous systems. In turn, the health and function of the oral tissues can affect and influence the health of the rest of the body.

Human Body A Nondivisable Psychosomatic Unit—Dentists are being trained to practice as physicians of the mouth. It is good dental practice to establish a healthy functioning masticatory mechanism and to eliminate infection as completely as possible including paradental pockets, infected teeth, and infected areas of medullary bone. In addition, proper diet and nutrition, proper oral hygiene, a state of good mental health, and the balancing of body chemistry and endocrine function can all contribute to the health of the oral tissues. What a person eats, absorbs, and assimilates, and how he thinks are extremely important. With the increasing consumption of highly refined, easily fermented carbohydrate and other commercial foodstuffs and the problem of the bottle, can, and pill becoming the foster mother of many children the dental problem seems to be increasing.

Posture and Health

Good posture helps the body tissues to function in balance without strain. Dentists are aware of the value of good posture while standing or sitting at the dental chair and its relation to health and fatigue. The dictionary defines balance as *equality* in weight, amount, force, effect; *harmony*, steady condition or *motion*. Man exists in a universe that is subject to the universal law of balance and as such he is supposed to function in a state of balance. Every known principle of mechanics can be found in the human body. Its tissues are living and have motion.

Balance and Counterbalance—The physical body is like two halves joined together with systems for balance and counterbalance. It was designed to function perfectly yet it is subject to stress and strain. Those who treat it are often surprised that



2. ***Sketch of membranes. Looking inside the head shown in Figure 1, this is a sketch showing the contour of the same base with the foramen magnum and the midline indicated. The position of the flax parallels the midline, as shown by the heavier marking. From it branch the free borders of the two "sickles" of the tent on either side, to merge anteriorly at the anterior inferior poles of attachment. Observe particularly the distortion of these "sickles" in relation to the general contour of the head and the position of the occiput.***

it can survive the abuse that is heaped upon it. All of these factors can influence the electro-colloidal, biophysico-chemical activity within constantly changing tissues.

State of Flux—The colloids are in a state of flux sometimes referred to as a "mad dance of electrons." This is true also of the bones of the jaws and head which are living, changing tissues rather than the static structures they were once thought to be. The observations and contributions of Sutherland[1] have advanced knowledge of cranial osteology, physiology, and pathology.

Advancement of Knowledge—New light has been shed on problems of structural malalinement, restricted articular mobility, and tense ligamentous tissue and their relationship to disturbed physiology, circulation, and nerve function within the head. The chemistry and movement of fluids in relation to the central nervous system is better understood and involves such congestive states as cerebral edema, retarded venous drainage, cerebrospinal fluid stasis, accumulation of metabolites. The number of disease labels put on conditions associated with these problems are numerous. Further study along these lines will provide much of special interest to physicians in the fields of nervous and mental diseases, eye, ear, nose and throat, and pediatrics as well as in general medicine and dentistry. This avenue of approach offers much hope to the migraine and the tic douloureux patient.

Bones of Jaw and Living Head

When osteology was studied in the dry skull the impression of rigidity and immobility was easily obtained. It is not easy to visualize the bones functioning in the dynamic living head. As a result, the impression was obtained of dealing with a rigid head, immovable except for the mandible which moves in the mandibular fossae of the temporal bones which are also regarded as immovable. Kimberly[2] states, "All of us retain a mental picture of the dry bones found in the dissection laboratory and the specimens used by lecturers in the classroom. The living bone with its normal complement of fluids is like other tissues in that it is pliable and has a quality of resiliency."

Motion Present Between Bones—It has been shown by Sutherland[1] that a small amount of motion is present between the normally articulated bones of the living head. The bones move through ranges of limited movement according to the direction and type of sutures or articulations. Their movement is slight yet palpable to fingers with a delicate sense of touch.

Motion Palpable—The fingers feel the bones being moved by the membranes which enclose them and to which they are attached and also by the movement of the fluids surrounding them. Embryologically the base bones of the skull are derived in cartilage, but vault and face bones are derived in membrane and through life continue to move in the membrane.

Hinge Motion Noted—Sutherland observed serrated sutures to have small amounts of hinge motion, but little or no crosswise or up-and-down motion. Squamous sutures with little grooves and intermeshing ridges were

[1]Sutherland, W. G.: The Cranial Bowl, Mankato, Minnesota, Free Press Co., 1948, pp. 27-41.

[2]Kimberly, Paul E.: Force Behind the Craniosacral Mechanism, J. Osteo. Cranial A. 1:8 (Jan.) 1948.

3. ***Posterior view. Note the separation of the right lambdoidal suture and the overriding of the left. Lambda and inion are moved to the left. The supraocciput is low on the right. The right parietal overrides the left along the sagittal suture and the left temporal squama overrides the left parietal, explaining the tendency to more of a "horn" formation on the left with the periphery of the parietal so restricted.***

within the head sometimes produced unknowingly during extractions through the use of elevators, forceps, and mouth props which can be powerful fulcra. Forces capable of delivering a tooth from its bony support are powerful and can be transferred via the articulations to areas distant from the mouth.

Classification of Bones of the Skull—The bones of the skull have been classified and separated into two groups: (1) those of the cranial group, eight in number, and (2) the facial group, fourteen in number. Each group has midline or unpaired bones and peripheral or paired bones. The external layer of the dura mater serves as internal periosteum for the cranial bones. It emerges between the sutures and through the foramina where it joins and becomes continuous with the external periosteum outside the skull.

Meninges of the Brain—The dura mater, arachnoid, and pia mater compose the meninges of the brain. The internal layer of the dura folds to form the Falxcerebri between the hemispheres of the brain and the Tentorium cerebelli, Falxcerebelli and Diaphragma sellae. The dura

found to allow some degree of lengthwise gliding of the grooves. He also noted that the articular surface of the squamaus of the temporal bone resembled the gills of a fish suggesting articular mobility for a respiratory mechanism. His study enables better visualization of bones in a living head as being alive, dynamic, constantly changing, and capable of motion.

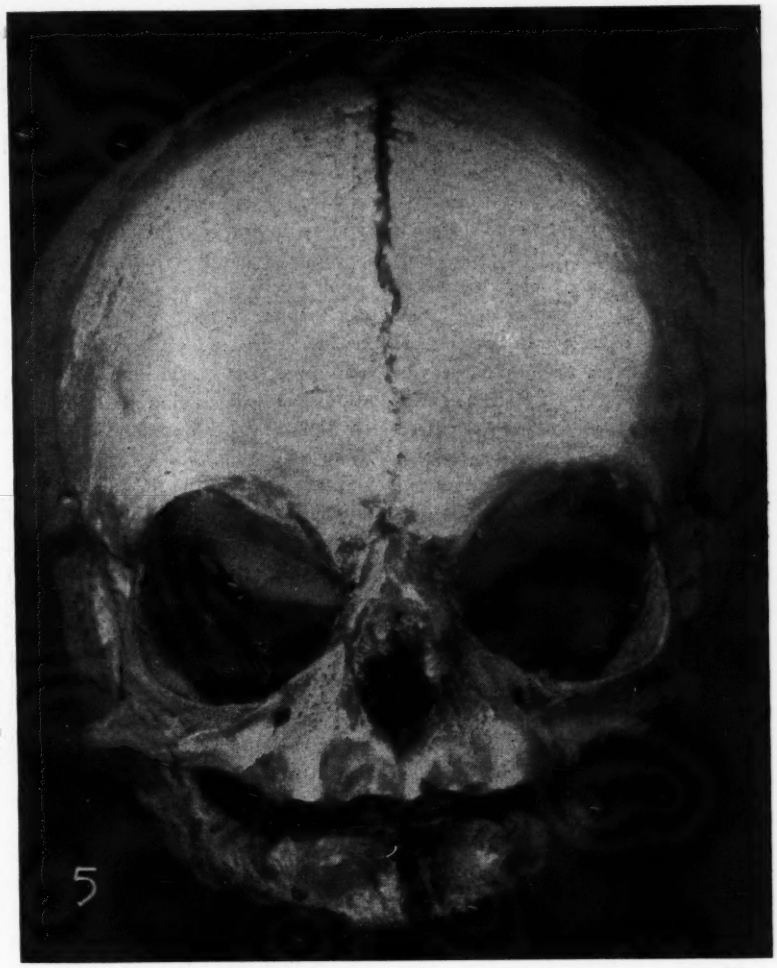
Important Region of Cranium—Dentists operate in close proximity to an exceedingly important region of the cranium with its delicate vital structures. Techniques should be completed with the greatest of care, using the lightest pressures possible. An awareness of the motion and function of the cranial structures enables the dentist to render a better service to the patient and some perplexing dental problems will be better understood. It will be possible to help prevent membranous articular strains

4. ***Left lateral view. Note further the overriding of the temporal squama and the frontal on the parietal. Normal relations at pterion are lacking, since from within outward the order is parietal, temporal, sphenoid, and frontal. The vault is in extension.***

passes through the foramen magnum forming the spinal dura which extends downward and attaches to the sacrum. These have been termed the Reciprocal Tension Membranes.

Delicate Balance—They are somewhat taut in the normal state, varying slightly in amount of tension and are delicately balanced with one another. This state of balance can easily be disturbed producing what is known as membranous articular strains similar to ligamentous articular strains in other joints of the body. These strains occur within the range of motion of the joint.

Referred Trauma—Trauma affecting one part of this reciprocal tension membrane mechanism can be referred to more distant structures. This is mentioned because dentists frequently treat automobile accident victims where there are jaw fractures and head injuries. The force or blow is frequently applied to the pelvis which includes the sacrum and is transferred up the spine to the head, producing a whip-lash effect. This can take place in addition to direct blows on the jaws or head. The mandible can receive a force and transmit it to the temporal bones. Great care and delicacy should be employed by anyone who has to extract teeth or treat fractures in accident cases as well as at other times.



5. ***Anterior view. From the anterior aspect the left temporal squama and right parietal can be seen overriding the left parietal. The vertical diameter is less on the left. The great wing is high on that side. Note the metopic suture, deviated septum, mental tubercle to the left, and externally rotated left zygoma.***[3]

Primary Respiratory Mechanism

This term has been given to a sequence of involuntary movements involving the fluctuation of the cerebrospinal fluid within its closed container, the inherent motility, or coiling and uncoiling of the brain and the shifting in the reciprocal tension membranes which assist and restrain the movement of the osseous mechanism of the skull and sacrum. Upon inhalation the central nervous system is observed to expand and a slight widening of the head takes place along with an external rotation movement of the paired bones of the head and a flexion movement of the midline bones. This occurs simultaneously and rythmically and the reverse movement takes place during exhalation. This primary respiratory mechanism is in contrast to secondary or diaphragmatic respiration which begins at birth with the first breath.

Alterations in Respiratory Mechanism—When the primary respiratory mechanism is altered it is believed that the disturbed physiology ultimately manifests itself as the symptom of a disease. The most frequent cause of these alterations is considered to be a loss or restriction of motion with some degree of malalinement of the cranial bones. This area then becomes a region of altered or disturbed function which in turn can modify the pattern of fluctuation of the cerebrospinal fluid.[3]

Mobility of Cranial Osseous Structures—Contracting and expanding movements of the brain are allowed by slight mobility of the cranial osseous structures. This movement reaches the bones via the reciprocal tension membranes to which they are attached and through the rhythmical fluctuations of the cerebrospinal fluid. The movement of each bone is thereby synchronized with each of the other bones and with the movement of the cerebrospinal fluid, the neural axis, and the meninges thus constituting a physiologic unit. The bones move into slight motions of flexion or external rotation for the inspira-

[3]Magoun, Harold I.: Osteopathy in the Cranial Field, Kirksville, Mo., Journal Printing Co., 1951, p. 19. Illustrations 209-211. Dental Pathology in the Light of Cranial Osteopathy, J. Osteo. Cranial A. 1:972, 1954.

tory phase of the cycle and extension or internal rotation for the expiratory phase.[3]

Rotation Movement—Flexion and extension movement is observed in those bones which are midline structures and rotate about a transverse axis. External and internal rotation movement is exhibited by the other bones, except the ossicles, to denote their direction of motion in relation to the skull as a whole. Flexion of the midline bones including the sacrum is accompanied by slight external rotation movement of the paired peripheral bones. Extension motion of the midline bones is accompanied by internal rotation movement of the peripheral bones, the cycle of motion then being complete.[3]

Temporomandibular Joint Symptoms—Because it is possible to adjust the occlusion of the teeth by correcting points of premature contact of occlusal, buccal, or lingual surfaces, and to construct occlusal splints, partial and full dentures, physicians frequently refer patients with temporomandibular joint symptoms to dentists. In the construction of these dental appliances it is assumed that the upper part of the temporomandibular joint is hard and unyielding.

Centric Relationship—The two mandibular fossae are thought to be fixed and coupled together as a rigid unit to form a fixed joint of reference for taking the Gothic Arch tracing to obtain the centric relationship of the mandible to the maxillae. This finding of a suitable horizontal relationship of the mandible and maxillae is accomplished by a needle point tracing device such as the Sears Trivit. This instrument records the forward, and right and left excursions of the mandible producing a tracing indicating the centric relation point. The mandible is considered to be in centric relation when the heads of the condyle are in the most retruded position from which the mandible can make free lateral movement.

Reevaluation of Common Assumptions

It is one of the purposes of this article to call attention to the possibilities of a dental viewpoint different from that currently held regarding the temporomandibular joint. The long-held assumption that the upper part of the joint is fixed and rigid should be reevaluated. Dental authors stress the fact that incorrect occlusion and an improper centric relation can produce various symptoms in the joint. Little mention is made by dental writers of the possibliity of the occlusion being faulty as a result of the upper part of the joint (the mandibular fossae) being in a strained or unnatural position following some form of trauma. Either or both temporal bones may become involved.

Stressful Combinations—A number of combinations are possible such as one temporal being strained in a position of external rotation and the other in a position of internal rotation. It is easy to test for temporomandibular joint malalinement by standing in front of the patient if he is seated or at the head of the table if he is supine. Ask him to open his mouth slowly and observe if the mandible remains in the midline during excursion or if it moves toward the left or the right. Observation can be confirmed by palpation.

Motion is Continuous—It has been shown that the temporal bones can exhibit some degree of independent motion and can alter their position slightly through a rotary movement unless fused or locked at the articulations. Movement continues during life and is involuntary. At death, the temporal bones go into a position of internal rotation with the last expiration of breath.

Problems of Temporal Bone—Magoun[3] states: "As elsewhere physiologic motion of the temporal bone is part of the primary respiratory mechanism in which the fluctuation of the cerebrospinal fluid and the action of the reciprocal tension membranes and the inherent motility of the central nervous system implement the articular mechanism of the cranial bones. The temporal bone has been called the trouble maker in the head. Perhaps it is merely the victim of circumstances since it relates to many important structures within and without. It is quite subject to trauma via the jaw and the vault and basilar bones with which it articulates."

Considerations of Temporomandibular Joint

Since either or both of the temporal bones can assume a strained position the problem of centric relation of the jaws cannot be considered without also giving some thought to the temporomandibular joint. It is not the intent in this article to cover either of these subjects in detail. Many articles have been published on these topics.

Correction of Centric Relation—In relation to denture construction or the insertion of splints to correct occlusion it can be seen that balance in these appliances will be difficult to attain if the centric relationship is incorrect. The true point of centric or balanced relationship of the jaws will not be found if the temporal bones controlling the position of the mandibular fossae are out of balance above. Should there be any doubt about the temporal bones a physician who is familiar with the problem should be consulted before dentures or splints are made.

An Elusive Neutral Point Sought—By thinking microscopically a great number of possible positions of the two mandibular fossae working independently can be visualized and unless locked into a strained unnatural position they are constantly fluctuating within slight yet palpable ranges of motion. The objective is an elusive point of centric relationship that is theoretically midway between the swings of internal and external rotation movement. In other words it is a neutral point in the swings of physiologic movement of the temporal bones provided they are in good balance with one another and with the other bones of the skull.

Development of Symptoms Within Joint—If either or both temporal bones should be locked or fused in a faulty position a centric tracing taken in this strained or nonphysiologic state tends to perpetuate the existing condition. This can lead to uncomfortable dentures or symptoms

within the joint despite good occlusal balance or a centric bite relation that was thought to be correct. In this situation the cause of the discomfort can be coming from the upper part of the temporomandibular joint.

Diagnostic Clue—The direction of the line made when the patient goes into the protrusive movement of the gothic arch tracing may give a clue that one of the fossae is out of position. A lateral pull on the mandible to the side of the externally rotated temporal bone may exist.

Relative Position of Auriculae—Another diagnostic test for the temporal bones is to observe the ears. The position of the auriculae can be checked in relation to the head and to each other. Since they are attached to the bone they can assume positions which give clues to the position of the temporal bones: (1) If the auricula is close to the head the temporal will be in an internal rotation position. (2) If bulging from the head, an external rotation position is suggested. (3) It can also be noted if they are superior or inferior or anterior or posterior to each other. (4) In viewing a face from the front the impression is sometimes obtained that one side of the face has slipped vertically similar to an earthquake fault, one half being superior in relation to the other half. All of these unsymmetrical patterns suggest distortion, twists, or misalinement of facial or cranial bones.

(End of Part One)

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(*See pages* 462 *and* 463)

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ALKALINIZED PROCAINE

in Acute Inflammatory Conditions

JOSEPH E. PRIMACK, D.M.D., Haverhill, Massachusetts

DIGEST

Nearly every dentist who uses local anesthesia in the practice of exodontia has at some time encountered the perplexing situation in which "everything is numb but the tooth." Some dentists will call this a "nervous reaction" meaning that if the symptoms of anesthesia are present the tooth must be "numb." Experience has proved, however, that such a situation can exist. This article presents an evaluation of this situation which has a practical clinical application.

Some Characteristics in Local Anesthetics

One authority[1] states that inflammation and congestion may create conditions preventing the normal physiologic action of local anesthetics. Often in such a case, the inferior alveolar, lingual, and buccal branches of the mandibular nerve may be blocked, and after waiting a sufficient time, the patient may have all the symptoms of anesthesia, but when an attempt is made to move the tooth, pain is severe. This condition may continue despite increased concentration of anesthetic and repeated block injections.

Normal Physiologic Action of a Local Anesthetic — Drugs used for local anesthesia have a specific action which is confined primarily to nerve tissue. Union of the anesthetic solution with the nerve tissue brings about the state of anesthesia. As the drug is absorbed or broken down to simpler compounds, sensation returns.

Procaine Most Widely Used in Dentistry—Effectiveness of anesthesia with procaine in most modern solutions used for local anesthesia is increased by four general methods: (1) increased concentration, (2) combinations of procaine with other drugs, by themselves more toxic, (3) newer synthetic drugs of higher potency, and (4) uses of vasoconstrictors to delay absorption of the drug, thereby increasing its effectiveness.

Drugs Obtained in Solution—Most local anesthetic drugs are obtained in solution as the hydrochloride salt. Aqueous solutions of this salt are acid in reaction, the pH range averaging 4-6. Alkaline substances, if added to an aqueous solution of the hydrochloride salt cause the free base to precipitate out of solution.

Clinical Differences in Solutions—It has been stated[1,2] that in mildly alkaline solutions, the dissolved free base of procaine possesses six times the anesthetic power of the hydrochloride. Other investigators,[3] however, in carefully controlled experiments, were unable to observe any distinct clinical difference between buffered and nonbuffered solutions.

Shifts in pH Concentration Avoided — Theoretically, injection of acid solutions into the normally slightly alkaline tissues should be avoided, but it is felt that under ordinary circumstances alkalinization does not increase anesthetic potency, because the normal buffer mechanisms of the body prevent shifts in pH concentrations and the solution becomes rapidly adjusted to the pH of the tissues.

Attempt to Maintain Constant pH —Buffers in the blood and tissues are chemical substances which react instantly with any mildly acidic or alkaline solution which is introduced, and attempt to maintain the pH at a constant level which is normally slightly alkaline.

Tissue pH is Lowered—In inflammation there is a disturbance of the normal mechanisms of fluid exchange.[4,5] As the inflammatory reaction progresses a walling-off process occurs due to a blockage of normal lymphatic drainage, and the tissue pH drops as low as 6.7 or 6.5. It is not in the province of this discussion to delve into the complex biochemical physiologic and pharmacologic reactions which bring about this effect.

Situation Defined

To return to the original situation: A condition of acute inflammation exists around a tooth which is to be extracted, and although the normal techniques for nerve block have resulted in typical symptoms of anesthesia, there is definite pain on attempting to move the tooth. Careful records have been kept of more than 50 of such cases in the past few years, and it has been found (1) that when a *buffered* anesthetic was administered as a *second* injection painless procedures could be completed within two or three minutes in more than 90 per cent of those cases, and (2) that, if more than 10 or 15 minutes were permitted to elapse the results were not as effective.

Method of Application—The solution used was the Cook-Waite Alka-

[1]Mead, Sterling: Anesthesia in Dental Surgery, St. Louis, Mosby and Company, 1951.
[2]Adriana, John: Chemistry of Anesthesia, Springfield, Illinois, Charles C Thomas, 1954.
[3]Tainter, M., et, al.: Summary of Studies on Optimal Composition of Local Anesthetic Solutions, Anesthesiology, **2**:5 (Sept.) 1941.
[4]Menken, Valy: Newer Concepts of Inflammation, Springfield, Illinois, Charles C Thomas, 1950.
[5]Menken, Valy: Carbohydrate Metabolism, Local Acidosis and Cytologic Picture in Inflammation, Am. J. Path. **13**:25 (Jan.) 1937.

linizing kit which consists of several cartridges of a 0.35 per cent sodium bicarbonate solution together with cartridges of a 2.2 per cent procaine hydrochloride solution in cartridges which have the plunger depressed about ¼ of an inch. By placing the bicarbonate cartridge into the syringe and injecting into the procaine cartridge just enough solution to force the plunger to its normal position, a mildly buffered solution of 2 per cent procaine results which is used for the injection. The solution is prepared when needed and used immediately.

Controls Difficult to Maintain—It is difficult in a personal practice to maintain controls which would put this report on a sound statistical basis, but most of the more popular brands of local anesthetics have been tried and sooner or later the typical "hot" tooth has been encountered which behaved in the previously described manner regardless of the type of anesthetic used.

Secondary Injection More Effective—For some reason which cannot be explained the alkalinized solution seems to be more effective used as a secondary injection than as the primary injection.

Possible Explanation

It is known that in the presence of inflammation there is an upset in the buffering mechanisms which normally would alter the hydrochloride salt used for injection to its free effective base, because the tissues are normally slightly alkaline. It is also known that the inflammatory process results in a lowered pH in the involved area. It might be logical to assume that use of an alkalinized solution in this situation would accomplish three things: (1) bring free, already dissociated, base into action, (2) reduce the acidosis in the tissues, and (3) increase the effectiveness of the solution previously injected, which has not been totally effectual because of the acidosis of the tissue.

Theory not Entirely Inclusive—In a block injection, however, which is made at some distance from the site of inflammation, the same phenomenon is seen as when the injection is infiltrated nearby. The above theory does not explain why the alkalinized solution is effective, for instance, in a mandibular block for an inflamed first molar.

Possible Relation to Chemistry of Nerve Impulse—The nature of the nerve impulse itself is not fully understood, and possibly when the complex chemistry of the nerve impulse is fully explained it may be possible to understand why the use of the alkalinized drug produces the results seen.

Summary

1. In certain areas of severe inflammation, it is sometimes impossible to obtain total anesthesia by use of the usual anesthetic solutions, which are mostly supplied as the hydrochloride salt of the particular anesthetic, in a mildly acidic solution.

2. It is felt that this condition exists because of the existence of acidosis in the inflamed area, which prevents normal buffering of the solution to its effective alkaline state.

3. Use of an alkalinized anesthetic solution as an adjunct produces satisfactory results in most cases.

4. The reasons for this are not completely understood, especially in block injections.

5. Further research and clinical investigation under control conditions are indicated to substantiate or disprove the findings reported here.

54 *Merrimack Street*

Use of Denture Powder

Query

Could there be chronic systemic poisoning from a denture powder containing sterculia gum, alkalized with sodium borate, particularly in relation to liver and kidney damage? Is there any evidence that such a preparation might be carcinogenic in relation to the liver and pancreas?

Answer

The occasional cancer related to artificial dentures usually is attributed to mechanical rather than chemical action The plastics employed in dentures at present are not regarded as carcinogenic. Sterculia gum closely resembles tragacanth. The latter enters so many comestibles that its lack of damaging properties has been established through wide use. Notwithstanding, tragacanth is a recognized sensitizer and thus is responsible for some food allergies. It is presumed that this is true for the kindred substance sterculia gum. Sodium borate, likewise, has been introduced into so many products for human use that its relative harmlessness is well established. When the quantity daily entering the digestive tract is less than 0.5 gram, no damage is expectable. The action of a much larger intake such as three grams is likely to be limited to minor digestive affronts, unless continued for long periods. The proper use of a denture adhesive containing sodium borate may not lead to other than trifling and innocuous exposure.

Adapted from Queries and Minor Notes, *Journal of the American Medical Association* **162**:152 (Sept. 8) 1956.

FREE-END SADDLE *Prosthesis:*

Part Two

ISAIH LEW, B.A., D.D.S., New York

DIGEST

Many patients, because of anatomic, functional, or psychologic reasons, resist tolerance or adaptation to a removable appliance for posterior free-end saddle restorations. In order to restore a complete arch and normal masticatory function in these patients, the employment of the unilateral implant may be justified. This article, which is the second of a two-part report, the first of which was published in January, 1957,[1] presents, in addition to the specific principles underlying the technique, two case histories with a detailed description of the treatment completed in each case.

Published Reports Incomplete

The literature on unilateral saddle implants is relatively meagre with debatable reporting on results and success. Weinberg[2] reported experience which formulated the basis for valid unilateral implant procedure. Lack of immediate fixation, however, and design for individual anatomic problems in his report created pitfalls causing a number of failures which challenged justifiable use of the technique.

Procedural Principles Stated

The author, analyzing the problems in unilateral fixed implants in a report[3] to the Academy of Implant Dentures in St. Louis, suggested the following principles which must be employed for a successful technique in constructing unilateral restorations by fixed implants.

Positional Firmness Important — As in a successful lower implant technique, the unilateral implant must be rigidly fixed in position at the time of insertion. Weinberg inserted implants under the mucoperiosteum and held them in position by sutures allowing normal healing to hold the implant. Movement of masticatory forces, tongue, and cheek, however, tended to displace the implant from its original position. The slightest shift of the implant encourages pushing of the peripheral strut through the thin buccal mucosa in the upper, and lingual mucosa in the lower (Fig. 19) with accompanying hygienic difficulties and consequent denuding of the framework.

Healthy Abutment Teeth Necessary—Other operators[4], misunderstanding the need for fixation, used the author's suggestion of a fixed splint for early retention, but attached the splint to a periodontally involved abutment with consequent failures. Since screws and circumferential wiring create needless trauma, the author devised the use of rigid, accurately fitting prosthetic splints to hold the implant in position at the time of insertion. This splint should always be attached to several healthy abutment teeth with the utmost care and precision.

Minimal Use of Struts—The author likewise observed the transient nature of alveolar bone under implants. Thus originated the urgency (1) to wait for "leveling off" of recent extractions, (2) of designing framework with a maximum of struts over peripheral cortical bone, and (3) the minimal use of cross struts resting on alveolar bone, limiting these to the struts holding the abutment.

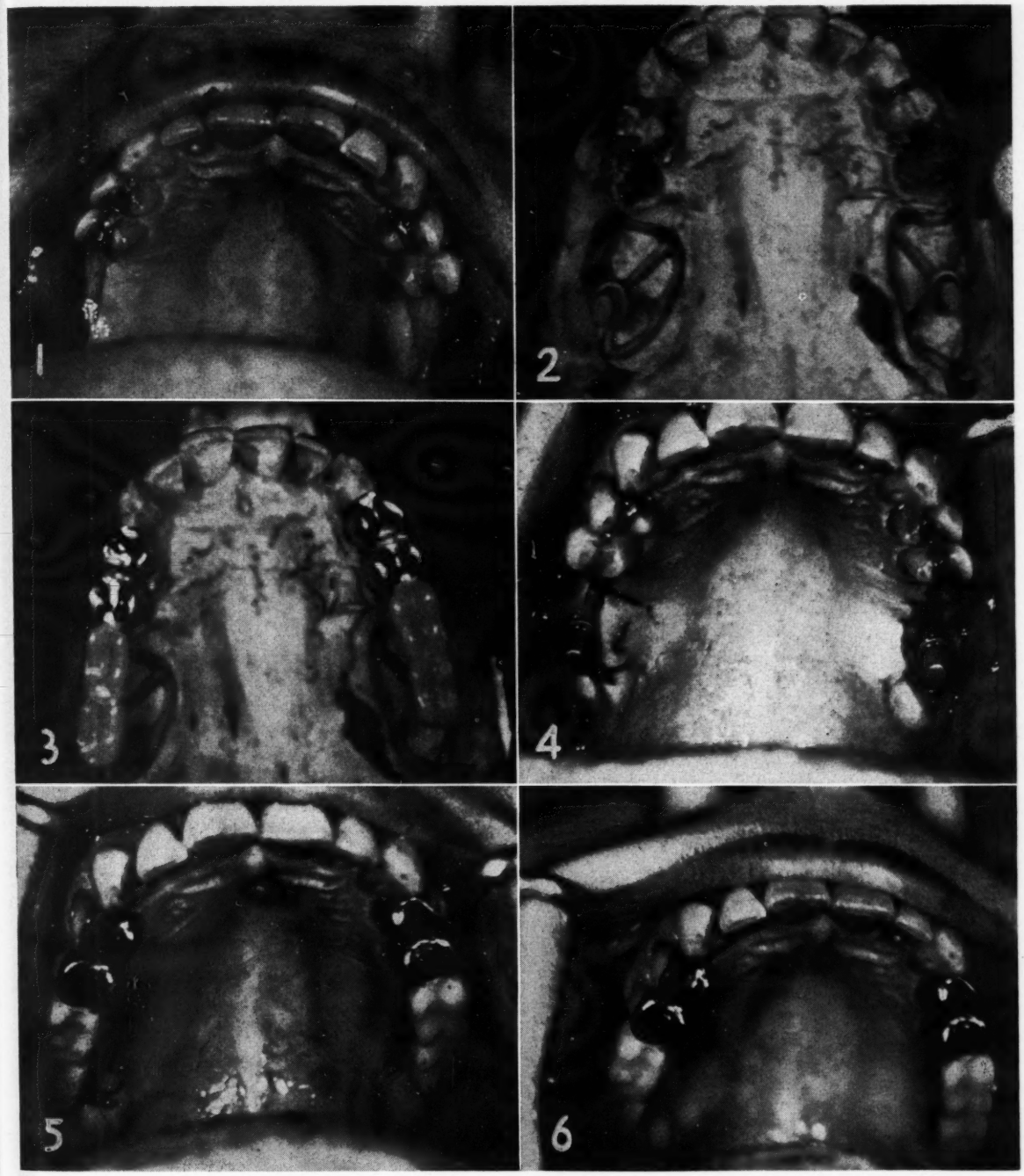
Struts Limited in Lingual Aspect —It was also observed that where the floor of the mouth approached the level of the ridge, it was safe to extend lingually. In case of high ridge, the fewer struts in the lingual aspect, especially near the mylohyoid ridge, the less danger of denudation of these struts through the friable lingual tissue.

Careful Technique Necessary—The need for careful surgery, suturing, and positioning of the implant must be stressed.

Use of Acrylic Superstructures—It was found that the use of acrylic teeth on the superstructure provided the best tolerant environment for implant success. Since the majority of patients incapable of tolerating conventional-end saddle prosthesis manifest bruxism habits and emotional stress outlet in their masticatory mechanism, it is considered advisable to minimize this constant trauma in supporting tissue of the implant and abutment teeth by (1) the judicious use of acrylic superstructures, and (2) repeated periodic reconstruction of the vertical on the acrylic teeth.

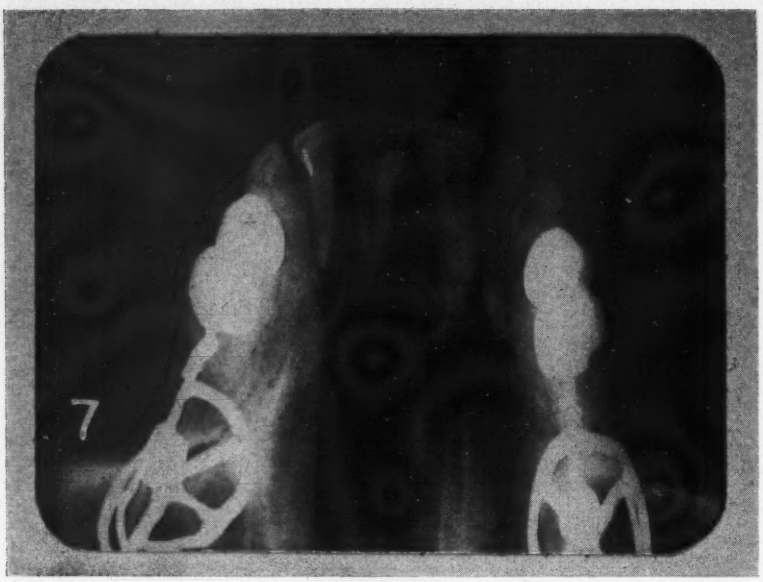
Technique Clinically Successful—

[1]Lew, Isaih: The Free-end Saddle Prosthesis: Part One, DENTAL DIGEST **63**:24 (Jan.) 1957.
[2]Weinberg, Bernard D.: Subperiostial Implantation of a Vitallium Artificial Abutment, JADA **40**:549-550 (May) 1950.
[3]Lew, Isaih: Problems in Implant Design, Lecture, First Annual Meeting of the American Academy of Implant Dentures, September, 1952.
[4]Linkow, L.: The Unilateral Implaint, DENTAL DIGEST **60**:302 (July) 1954.



1. *In this patient the upper posteriors were missing. Showing three-quarter crown preparation on biscuspids preliminary to implant impression.*
2. *Model showing implant fabricated and in position on master model.*
3. *Master model with three-quarter crown splinted to attachment and coping on implant covered by acrylic occlusals.*
4. *The same patient five weeks later with the implant inserted. The tissue was carefully coapted.*
5. *Fixed bridge splinted in position with diluted cement (zinc oxyphosphate).*
6. *Five days later sutures were removed.*

The author has refrained from presenting this technique (although preliminary discussion was reported to the American Academy of Implant Dentures in 1952) until sufficient time had elapsed to justify the clinical findings. It is in accordance with the principles outlined that several case histories and techniques are reported



7. ***Occlusal film showing adaptation of implant struts to stress areas of bone; malar process and palatal bone.***

as a demonstrated procedure for unilateral implant construction.

Case History One

A white woman 38 years of age, lacking all the upper molars had an anterior, incisal occlusion. Advanced periodontoclasia was present, and a history of having rejected several posterior palatal bar prostheses.

Treatment Procedure—1. The bicuspids (Fig. 1) were prepared for three-quarter crowns.

2. With zygomatic and posterior palatal local anesthetic, (1) the mucosa was retracted, (2) the alveolar bone denuded buccally to the molar process, posteriorly to the tuberosity and palatally well toward the midline.

Impression Extremely Important—Care was taken to achieve a model with the three-quarter crown preparation accurately keyed to the model of the denuded surface. Careful hydrocolloid techniques, or rubber base impressions and previously prepared trays provided means for creating models in which the dies for the crowns, the implants, and the temporary splint could be fabricated.

Further Steps—1. While the tissue was retracted, a wax bite relationship was established to the opposing teeth.

2. Models were poured and the implant was designed to provide an abutment at the terminal end of the saddle.

3. An immediate splint (or bridge) was fabricated using the two three-quarter crowns for abutments, attached to a gold core and connecting bar which was fitted over the posterior abutment of the implant (Figs. 2 and 3).

4. In six weeks, the patient was again anesthesized, and the implant was inserted (Fig. 4). The tissues were coapted and ligated buccally out of line of the pontics (Fig. 5).

6. The immediate splint was cemented in position with a diluted zinc oxyphosphate cement and the occlusion was balanced.

7. In this patient the centric immediately slipped posteriorly relieving the edge-to-edge bite with rapid and spontaneous improvement of the advanced periodontoclasia in the anterior teeth.

8. In a week the sutures were removed.

9. Six weeks later the immediate splint was removed and a new bridge was made which was better adapted to the healed mucosa (Fig. 6).

10. Occlusal x-rays (Fig. 7) show adaptation of the splint to the implant. For three years this implant has given the patient complete satisfaction, restoring natural function with a minimum of bulk, mobility, and discomfort.

Case History Two

A middle aged white woman had complete upper natural dentition, six lower anterior teeth, and one left molar. She had experienced repeated difficulty adjusting to a conventional prosthesis. After several efforts at precision attachment prostheses which resulted in a badly atrophied right ridge, her dentist recommended an attempt at a lower implant. Since the right cuspid abutment showed apical and periodontal involvement from previous prosthetic attempts, it was suggested that the five anteriors be splinted to the implant molar abutment.

Procedural Steps—1. Using a mandibular block and long buccal injection for anesthesia, a vertical incision was made anterior to the cuspid and continuing on the crest of the ridge to the retromolar pad.

2. The tissue was retracted and ligated out of position.

3. The five anterior teeth were previously prepared for full coverage (Fig. 8), and the right cuspid given proper root canal treatment and gold core coping.

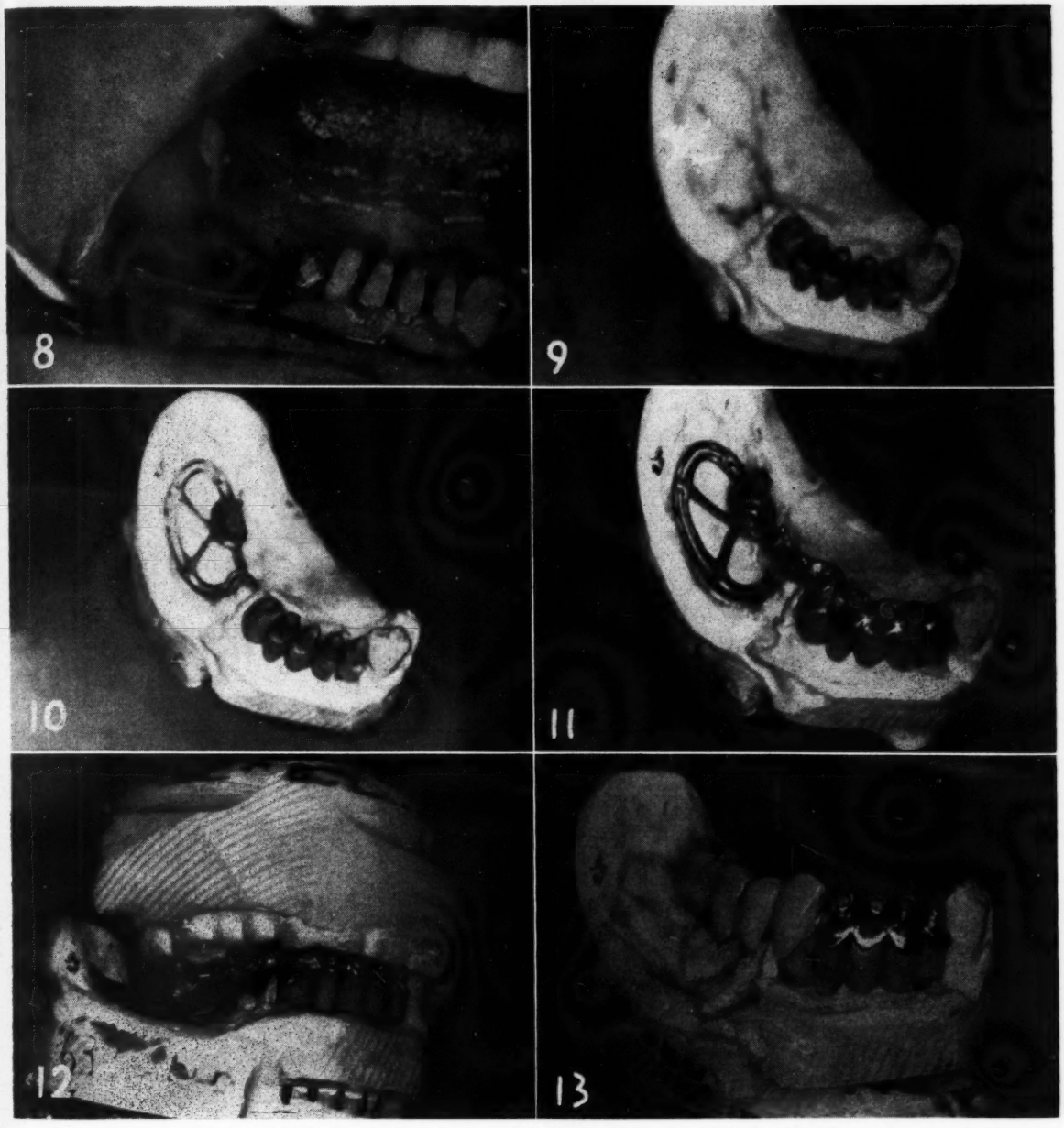
4. A snap compound impression properly undercut and washed with a mercaptane (rubber) impression material provided an adequate impression of the prepared abutment teeth and denuded alveolar bone.

5. A wax bite was taken, and the tissue was carefully coapted.

6. Carefully poured models with diolite dies of the anterior teeth were made (Fig. 9).

7. The model was articulated with a counter impression of the opposing teeth and the implant was designed (Fig. 10).

8. Gold core copings for the five anterior teeth and a connecting rod for the coping for the abutment of the implant was cast in one piece (Figs. 11 and 12).



8. ***Lower anteriors prepared for coping. Note low alveolar ridge.***

9. ***Model poured of denuded bone. Implant design is outlined. The anterior teeth are duplicated in removable diolite dies.***

10. ***The implant is cast and x-rayed for flaws, positioned on the master model. Note double strut on external oblique ridge where stress is more easily absorbed.***

11. ***Gold core copings and frame of bridge connected to copings on implant.***

12. ***The entire assembly articulated and ready for acrylic anatomy.***

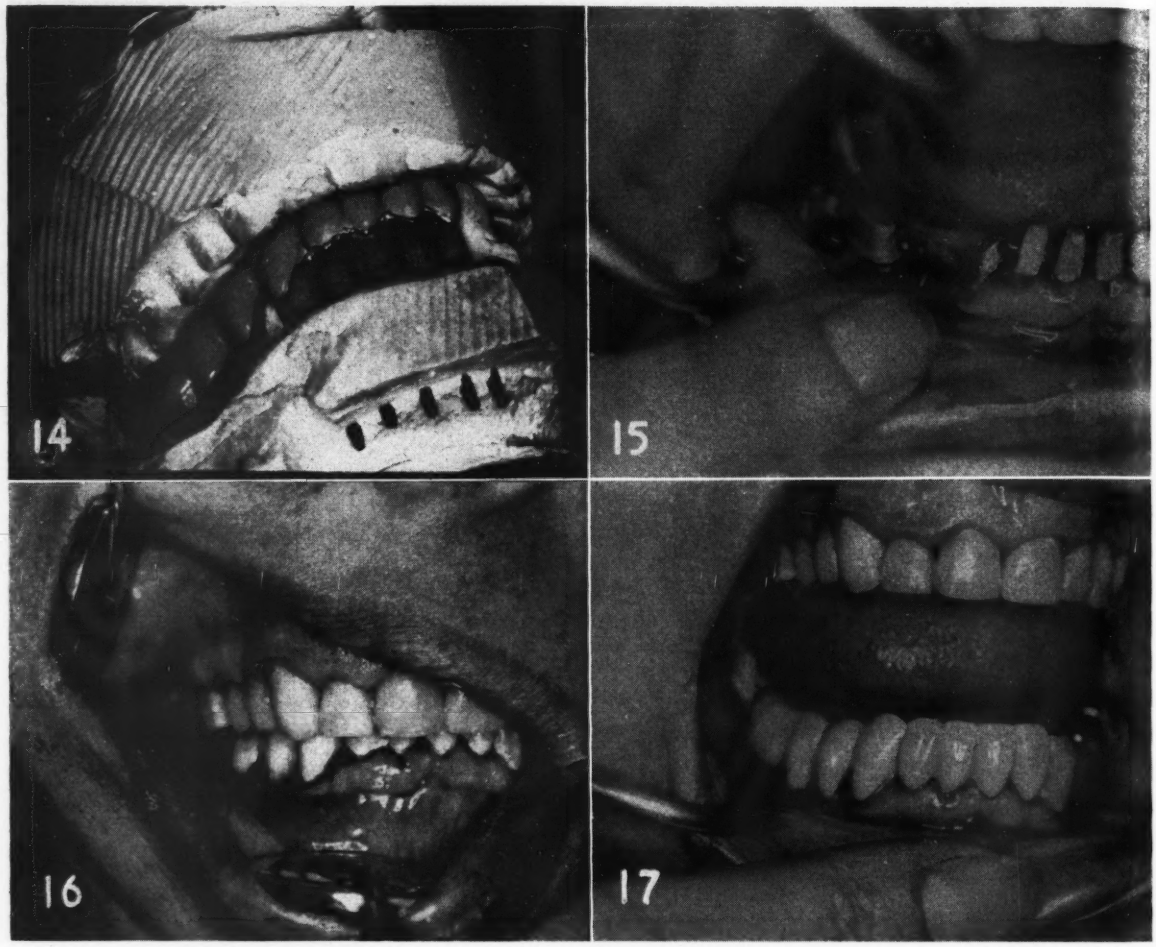
13. ***Posterior segment of the splint processed to gold framework.***

9. The posterior teeth were processed and articulated. Removable acrylic anterior jackets were also fabricated (Figs. 13 and 14).

10. The entire assembly was tried on the anterior prepared teeth before the implant was inserted.

11. In five weeks, the mucosa was again retracted, the implant was inserted, the tissues coapted and sutured buccally as shown in Figure 15.

12. The splint or fixed appliance was cemented with temporary cement material and the occlusion was properly balanced.



14. *Anterior four teeth processed in acrylic.*
15. *Implant inserted.*
16. *Splinted bridge cemented with temporary cement.*
17. *The case one year later.*

13. The left side was restored with an acrylic bridge from cuspid to molar.

14. In seven days the sutures were removed, the tissue was found completely healed, and the patient reported minimum discomfort (Figs. 16 and 17).

15. Six weeks later the entire splint was removed and recemented, and the occlusion examined. Intraoral x-rays (Fig. 18) showed close adaptation of the implant to the bone and relationship to the splint.

Conclusion

These case reports complete a discussion of the treatment of a free-end saddle prosthesis that resisted adaptation to conventional prosthetic efforts. The author enjoins against promiscuous application of these techniques. Judicious application of the technique, however, to difficult situations have provided complete and satisfying restorations for a sufficient period of time to prove its value.

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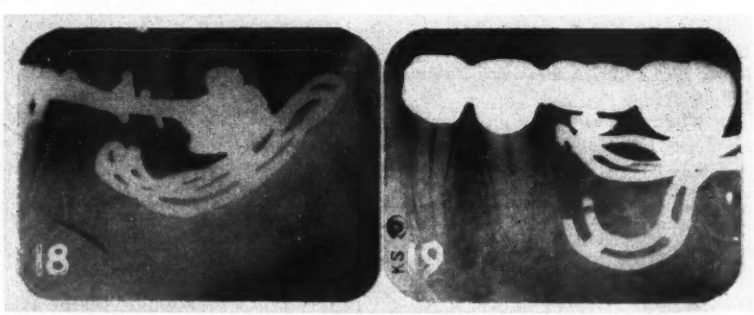


18. *X-ray (intraoral) showing relationship to implant, bone, and splint.*
19. *Old unilateral implant with lingual perforation cut away and functioning normally.*

The EDITOR'S Page

THE temporomandibular joint (TMJ) is a bilateral joint and the two parts are joined by a bridge of bone, the rami and the body of the mandible. This structure makes the TMJ anatomically unique. The joint is subject to inflammation, displacement, and strains that are stresses common to all joints. Because the TMJ is part of the cranium the disturbances in this zone are close to the higher centers of the nervous system in the brain. Whereas a dislocation of the shoulder or arthritis in the knee, for example, may cause severe local pain, a disturbance of the TMJ may excite an excruciating painful face-ache, may simulate neuralgias of the trigeminal nerve, or may be interpreted as the expression of sinus or ear disease. All manner of bizarre symptoms may be associated with inflammatory or mechanical disturbances of the TMJ.

Costen popularized the concept that mandibular overclosure might produce severe syndromes of facial pain and deafness. Following Costen's publication, many dentists seized the idea with fervor and propelled a wave of bite-raising procedures. Some of these restorations were helpful to those who suffered from mandibular overclosure; some suffered irreparable injury to their dental tissues and to the structures within the TMJ. Campbell is quite correct when he writes: "The dentist has every reason to be proud of his craftsmanship, but it could be argued that he has developed his mechanical and artistic skill at the cost of neglect of available knowledge. He has a limited view of sophisticated man in his ecologic background. The cult of precision, however commendable, should not be confined to the inside of the mouth. Our obsession with mechanics has, to some extent, secluded us from the biologic and psychogenic aspects of nondental face-ache."[1]

Cambell has wisely proposed that the dentist apply the principles of orthopedics to extend the TMJ space that has been impinged upon by inflammatory reactions or mechanical encroachments. The principle of *traction* that is used to separate joint surfaces is as important to relieve disturbance in the TMJ as to relieve distress in the other joints of the body.

The exact orthopedic application of traction to the TMJ is described by Campbell as follows:

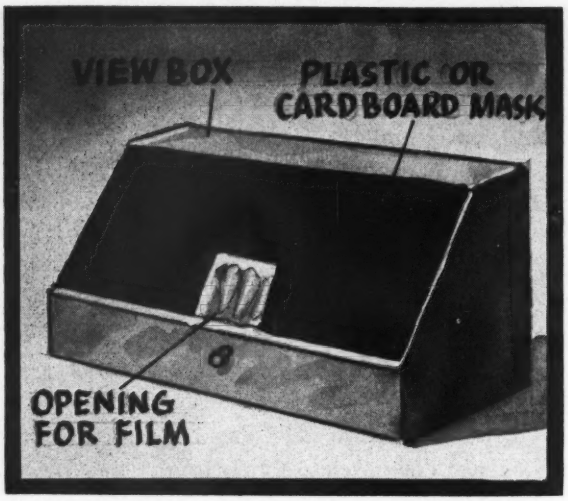
"The masticating muscles must not be stretched indeterminately; a careful technique must be followed. The resting position of the mandible must be assessed as best it can, and the splint built up to fill the interocclusal clearance. Bearing in mind the fact that a muscle cannot be stretched abruptly, the splint should be raised no higher than is the practice in complete denture procedures. This decides the vertical dimension of the first stage of the treatment, that is, an interocclusal clearance of 2 millimeters should be arranged. After this splint has been worn for a few weeks, the occlusal vertical dimension is increased to a height which eliminates all interocclusal clearance. After the passage of a further few weeks, the occlusal vertical dimension is increased 2 millimeters, thus beginning the restoration of the muscles to their true resting length.

"The splints usually have flat occluding surfaces, but there is one occasion for a monobloc, which is made by anchoring the upper and lower flat occluding surfaces together. The monobloc is particularly useful when one condyle is displaced horizontally, that is, where prolonged cusp-interference has twisted the mandible forward on one side and backward on the other. First, the cusp interference is eliminated, and then the jaw straightened up by a correctly oriented monobloc.

"Our patients are instructed not to wear the splints continuously during muscle adjustment, because a muscle kept overlong in tension will accumulate painful waste products of metabolism. As the splint becomes acceptable to the patient, it is worn for longer periods, obviously during sleep. Occasionally, a temporary denture is supplied to reinforce action of the splint. In cases where existing complete dentures show excessive interocclusal clearance, and by reason of the fact that the soft splints cannot be used for chewing, it might well be that all of the benefit derived at night from the resilient splint, is undone during the day while masticating with a defective denture. I emphasize that such a denture is 'temporary.' A final denture cannot be contemplated until the mandibular relations have settled into proper adjustment. The whole procedure may seem over-elaborate, but there is no alternative for these sad patients who are often at the end of their tether.

"For many years, our temporary splints have been made of a resilient material [Poly-vinyl chloride]. This plastic should be processed in dry heat at 150° Centigrade [262° Fahrenheit] to bring out its best elastic properties and maximum strength. The material is kind to tender edentulous ridges, and it snaps into undercuts where natural teeth are present."

[1] Campbell, J.: Extension of the Temporomandibular Joint Space by Methods Derived from General Orthepedic Procedures, J. Pros. Dent. 7:386 (May) 1957.



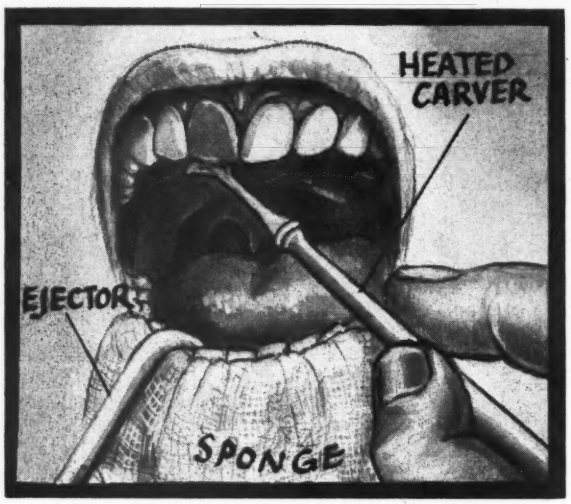
1

Clinical and Laborator

An X-ray Viewing Aid

Richard J. Maskal, Lebanon, Illinois

1. Make an opaque plastic or cardboard mask to keep out extraneous background light when viewing single or double x-ray films in a large view box.

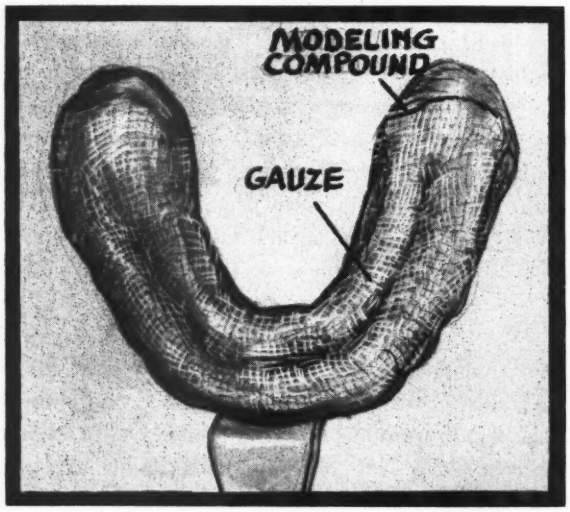


2

Protection of Lower Lip During Waxing Procedure

Henry C. Stouffer, Jr., D.D.S., Lancaster, Pennsylvania

2. Unfold a 2 by 2-inch exodontia sponge and place it over the lower lip. Allow the salivary ejector to rest on the sponge which will keep the gauze in position. During waxing procedures the sponge will protect the lower lip from drippings of hot wax.



3

Use of Gauze in Alginate Impressions

Edward J. Berens, D.D.S., Hammond, Indiana

3. Line the peripheral and retromolar areas of the tray with modeling compound. Embed a piece of gauze into the hot compound. The alginate impression material will adhere to the gauze.

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Copper Dies

Warren W. Cowan, D.D.S., Detroit

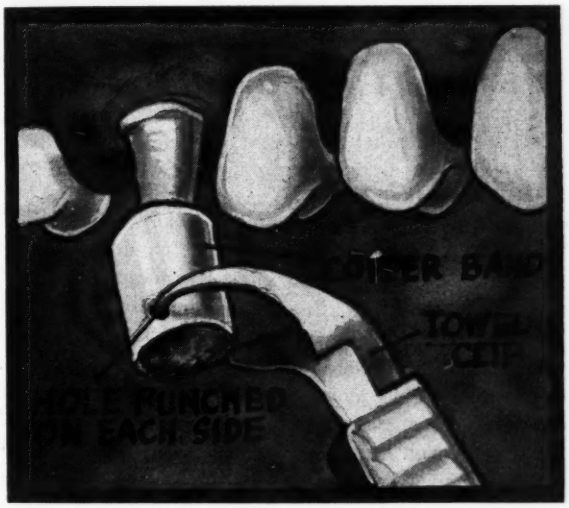
4. When pouring several dies it is convenient to wrap them in asbestos paper so the metal will not burn the fingers of the operator.

4

Copper Band Remover

S. M. Dooreck, D.D.S., Brooklyn, New York

5. Punch two holes in the copper band before inserting the material for an impression. When the impression is ready to be removed, place the prongs of a towel clip in the two holes in the copper band. The impression may be removed without distortion.

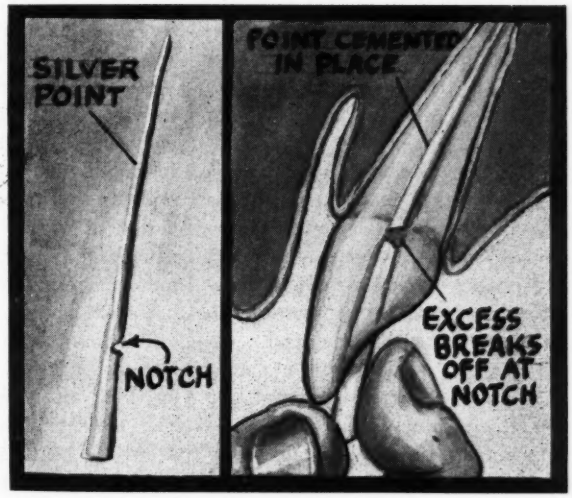


5

An Endodontic Technique

David J. Davis, D.D.S., Milledgeville, Georgia

6. Before cementation of a prefitted silver root canal point, cut a notch in the point where it enters the coronal portion of the tooth. When the cement has set, bend the part that projects into the coronal portion to separate it from the cemented part in the canal.



6

technique involved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time. Turn to page 453 for a convenient form to use.

Send your ideas to Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

MEDICINE and the Biologic Sciences

Salivary Gland Tumors

Tumors of the parotid and submaxillary glands constitute only about one per cent of human neoplasms. Most tumors are found in the parotid gland. Occasionally the lip and palate are involved. Almost all these tumors are of epithelial origin. Benign growths are differentiated from malignant tumors by slow growth, lack of pain and facial paralysis, soft or rubbery consistency, and nonfixation to skin or deeper structures.

Simple adenoma is small, slow growing and round or oval and has a delicate fibrous capsule. Simple adenoma is rarely observed. The most common types of benign salivary tumors are complex adenomas or mixed tumors. Complex adenomas are nodular or lobulated and are moderately firm and of rubbery consistency. A glistening, somewhat sticky surface with occasional areas of necrosis is seen on cut section. The tough fibrous capsule surrounding the gross tumor may be deceptive, since microscopic breaching of the capsule by neoplastic cells is often seen. The growths follow a protracted, essentially benign course and, except for bulkiness, are of slight inconvenience to the patient. A small number may become malignant.

Cystadenoma lymphomatosum is an uncommon benign tumor that occurs exclusively in the parotid gland. Grossly, reddish-brown parenchymal tissue is embedded in gray lymphoid tissue. Because of soft, fluctuant consistency and location in the lower pole of the parotid, the growths may be confused with branchial cysts or abscesses.

Carcinoma is characterized by rapid growth, pain, facial nerve paralysis, stony hard consistency, and fixation. About 20 per cent of salivary tumors are carcinomatous. Adenocarcinoma is the most common type. This may be highly malignant, exhibiting early local and distant metastases. Unless adequately treated, the growth will cause death.

Extent of surgery depends upon the type of tumor. Simple benign tumors are excised. Complex adenoma generally requires superficial lobectomy with preservation of the facial nerve. All carcinomas, with the possible exception of some mucoepidermoid growths and the acinic cell adenocarcinoma, should be resected radically, with sacrifice of the facial nerve and, probably, the nodes in the neck.

Johnson, Joseph K.: Tumors of the Major Salivary Glands, Tex. J. M. **51**:749-753 (*November*) 1955.

Dry Upper Respiratory Membranes

Since allergy and infection are common causes of otolaryngologic symptoms, hypersecretion or excessive fluidity of secretions may be overemphasized. In about 20 percent of instances, upper respiratory symptoms are produced by increased viscosity of mucus and dry mucous membranes. Often these symptoms mimic manifestations caused by hypersecretion.

The nose may be blocked, dry, burning, tickling, filled with a mucus plug or susceptible to bleeding. The patient may report that nose drops are benficial for only a short time and that sneezing, salt water washes, or packing gives relief. Oropharyngeal and pharyngeal symptoms include dryness, thick phlegm, morning sore throat, postnasal drip, sensitive tongue, lump in the throat, tired throat muscles, or metallic taste.

Dryness of the larynx may be reflected by constant throat clearing and intermittent hoarseness. Common chest complaints are cough, substernal burning with deep breathing, exertion dyspnea, and wheezing.

Causes of viscid mucus are protean. Epithelial change may result from vitamin A or nicotinic acid deficiency. High carbohydrate intake or diabetes mellitus increases the mucin content of the secretions. Anxiety, cold beverages, or chilling the body may produce vasoconstriction. Sympathomimetic drugs, parasympathetic blocking agents, smoking, excessive coffee drinking, insufficient water intake, or dehydration from any cause may be the etiologic agent.

Membranes are dried by lowered atmospheric humidity, central heating without proper humidification, astringent dusts, and oxygen inhalation. Anatomic abnormalities or surgical removal of structures may interfere with function. Acute and chronic infections produce membrane changes and allergic states decrease the water content.

The diagnosis can be made by physical examination and cytologic study. The throat may appear red, dry or normal except for glistening membranes coated with a thin layer of viscid mucus. Threads, globules, or dried crusts of mucus may be found. Mucus turns opaque and yellow with increased age. The material is difficult to spread on a slide and resists drying and decolorizing. A large amount of homogenous mucus containing a few cellular elements is usual. Numerous bacteria suggest either a subacute infection or stagnation of secretions.

Symptomatic relief is directed toward liquefying the viscid mucus, moistening the mucous membranes, or stimulating mucus production by systemic or topical drugs. Efficacy of all treatment depends on the amount of metaplastic change in the mucosa.

Anderson, Jack R., and Rubin, Wallace: The Diagnosis and Treatment of Upper Respiratory Symptoms Produced by Increased Viscosity of Mucus and Dryness of the Mucous Membranes, Laryngoscope **66**:85-92 (*February*) 1956.

Dermabrasion

Usually patients with acne scars can be assured some improvement by dermabrasion. To assure a good result, however, the selection of the patient must be carefully made.

Probably the most important factor in selection is the patient's psychologic state. A person who ascribes all personal problems to the acne pits often is discontented with even considerable improvement of pocks by dermabrasion. If obsession over acne scars is a strong defense mechanism, benefit from therapy may precipitate a prepsychotic patient into psychotic state. Psychiatric consultation, therefore, is often advisable to determine a patient's suitability for therapy.

Some types of scars are not improved as much as the usual superficial type. These include the wide, flat, confluent scars that cause an undulating appearance of the skin surface, and the punched-out, deep, sharp-edged scars of the ice-pick variety.

Patients with superficial and slight scarring usually are not satisfied with anything less than total obliteration of scars. Usually this is impossible. These patients should not be encouraged to have the procedure done.

Preoperative photographs should be taken in order to record clearly all pits and to allow accurate appraisal of improvement after abrasion. Acute acne should be controlled with the usual measures before dermabrasion is begun.

The abrading device is a motor mounted on a floor stand with a flexible shaft attached. A handpiece is fastened to the end of the shaft. Speed of rotation is governed by a foot-operated variable rheostat.

After abrasion, elevation of the head while sleeping helps to lessen facial edema. The face is not washed or shaved for eight or nine days. Then, the crust should be almost completely off. If this is delayed, warm boric acid compresses will hasten removal. Drying medications and vigorous washings are avoided until erythema subsides. Exposure to sun should be avoided for a month.

Hyperpigmentation will fade gradually and spontaneously. Slight eczematous reactions are extremely resistant to therapy but usually disappear spontaneously. Infection is rare and the patient is not seen until four weeks after the procedure. Preferably three months should elapse between dermabrasion procedures. Usually two or three treatments are sufficient.

Sirot, Gustave, and Rein, Charles R.: Current Status of Dermabrasion Therapy, Connecticut M. J. **20**:1-9 (*January*) 1956.

Rheumatic Fever

Underprivileged children particularly are susceptible to rheumatic fever. The incidence of the disease increases directly with poverty, malnutrition, overcrowding, and bad housing.

Nutrition is a significant conditioning factor. An insufficiency of several nutrients may be more important than a deficiency in one. Children with rheumatic fever frequently have not received sufficient eggs, meat, milk and vitamin D. As a consequence, a preference for carbohydrate and even an aversion to protein may be established.

Children with rheumatic infection almost always fail to grow and develop normally. Good growth, implying adequate nutrition, promises a favorable outcome of rheumatic disease.

Infection of the tonsils is a common cause of poor food utilization. The value of tonsillectomy for rheumatic children probably depends on the influence of the operation on the general health.

Children with rheumatic fever frequently have nitrogen and calcium deficiencies, as judged by high retention when adequate intake is offered. During replacement of depleted nitrogen and calcium stores, weight is not gained and may even be lost as fat and water are replaced by nitrogenous tissue.

When cortisone or ACTH is given, losses of nitrogen are large during the first ten days, the metabolic rate drops and appetite increases. When the hormone is stopped, storage improves rapidly and equilibrium is established in about two weeks.

Combined administration of cortisone or ACTH, salicylates, and ascorbic acid gives significantly better results than previous regimens. An improvement in the nutritional state, because of increase in appetite, is an important effect of hormone therapy.

Role of Hormones in Protein Metabolism

ROBERT E. OLSON, M.D., Ph.D., Pittsburgh

THE HOMEOSTATIC responses that occur in growth, starvation, and injury are governed in an important way by intricate changes in hormonal secretion. The metabolic changes that occur in diabetes mellitus and after the administration of cortisone for the control of inflammatory disease involve other endocrine adjustments that must also be appreciated if optimum management is to be instituted. Diet therapy bears an important relationship to optimum management in all of these states; the need for and acceptability of nutrients —not only dietary protein, but others—must be understood if optimum growth, convalescence, and health are to be obtained. Endocrinology and nutrition are inseparably associated at the cellular level; their important interrelationship should be understood in the practice of medicine as well.

From Council on Foods and Nutrition, *Journal of the American Medical Association* **164**:1765 (August 17) 1957

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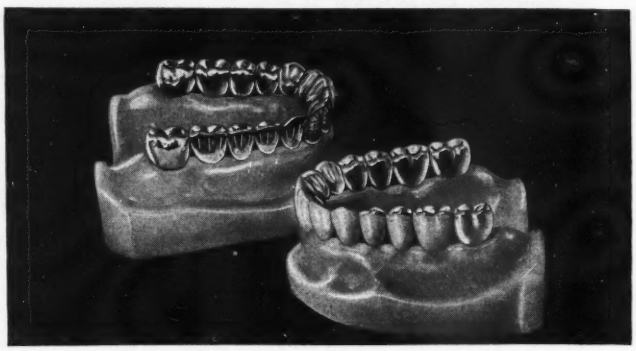

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Prolonged bed rest and inactivity as commonly employed in treating rheumatic fever adversely influence the retention of nitrogen and calcium. The slight activity necessary to offset disuse atrophy and the destruction of nitrogenous tissue can be obtained by slow walking. So long as the exercise does not significantly increase pulse pressure and pulse rate, the effect will be anabolic and beneficial.

Johnston, Joseph A.: Studies in Rheumatic Fever, Am. J. Dis. Child. **91**:250-267 (*March*) 1956.

Pregnancy— Heart Disease

Pregnancy represents a circulatory overloading. The heart rate increases by 20,000 beats per day and the blood and pulse pressures mount slightly. The circulating blood volume increases up to 45 per cent and the cardiac output rises by 40 to 50 per cent. The arteriovenous difference of oxygen is reduced by one half and the oxygen consumption of the mother goes up 15 to 20 per cent. These changes begin about the third month, rise abruptly during the fifth month and are greatest in the eighth month.

The placentary arteries connect widely with the respective veins through tortuous intervillous spaces without the interposition of arterioles or capillaries. An arteriovenous placentary fistula of several centimeters in caliber results, which accounts for numerous hemodynamic alterations.

The normal heart can handle the added burden of pregnancy. Cardiac reserve may be surpassed, however, when the overload of pregnancy is added to the strain of a congenital malformation.

With patent ductus arteriosus, the size of the ductus is of primary importance, as the size determines the volume of blood flow through the ductus. Should the flow be excessive, cardiac reserve is threatened when a new arteriovenous fistula, the placental, is added.

Patency of the ductus arteriosus puts additional load on the left ventricle, whereas the placental fistula overburdens all heart chambers. The combination strains the entire heart, but especially the left ventricle. A patient with patent ductus who carries through pregnancy without trouble probably has a small shunt.

Patients with arterial septal defects often tolerate pregnancy well. If, however, the malformation produces excessive filling of the right cavities during pregnancy, the arteriovenous shunt may reverse and cause cyanosis and death.

Pulmonary stenosis with resultant right ventricular hypertrophy usually causes no untoward effects when associated with pregnancy. Since bacterial endarteritis is frequent with patent ductus arteriosus, surgery may be advisable. Operation may be done during pregnancy if the condition of the patient is not critical. Cesarean section should be used only when required by gynecologic problems or for patients with aortic coarctation.

Espino-Vela, Jorge, and Castro-Abreu, Dirson: Congenital Heart Disease Associated with Pregnancy, Am. Heart J. **51**:542-561 (*March*) 1956.

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Experience with New Posterior Teeth Confirms Research Findings

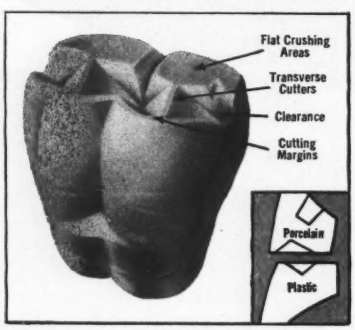
MYERSON AND SEARS DESIGN AND COMBINATION OF MATERIALS PROVE BENEFICIAL IN FULL RANGE OF CASES

Review

February 1956, Richard L. Myerson reported to the American Academy for Plastic Research in Dentistry his finding of dramatic reduction in wear of plastic teeth when opposed to properly designed porcelain teeth. November 1956, Victor H. Sears and Simon Myerson reported remarkable success in forty-eight clinical test cases. At the time of this writing, thousands of full dentures have been made with Myerson and Sears porcelain-plastic posterior teeth by the profession-at-large. There can be no doubt that this use has been extensive enough to be highly conclusive.

Results

Success has been reported on the most difficult as well as on normal cases. Equally important, no single case of failure or disappointment has been reported either voluntarily or upon solicitation.



Details of occlusal construction of new Myerson and Sears posterior teeth. Insert drawing shows how upper and lower teeth meet in one plane.

Conclusion

Many benefits can be derived from the use of Myerson and Sears posterior teeth. They are listed below.

I Benefits of Opposing Porcelain Teeth to Plastic

1. One tenth the loss due to wear compared to that experienced when opposing plastic teeth to plastic.
2. Less shock and resultant trauma and "clicking" than porcelain-to-porcelain.
3. Easier adaptation and adjustment due to lower teeth being plastic.
4. Increased masticating efficiency due to maintenance of sharpness by the upper teeth which are porcelain.

II Benefits of the Myerson and Sears Occlusal Design

1. Fulfilling the requirements essential to success in opposing porcelain to plastic.
2. Increased stability by directing the vertical force of mastication mainly to the lingual side.
3. Increased stability by directing most of the vertical force of mastication to the second bicuspid — first molar region.
4. Increased stability by absence of interdigitating cusps.
5. Easy set-up and articulation.

Whenever the above benefits are desired, the use of these new posterior teeth is indicated.

Available literature includes a booklet describing the new development, a technique by Dr. Victor H. Sears, and mould charts. Inquiries are welcomed. Address: MYERSON TOOTH CORPORATION, 91 Hamilton Street, Cambridge 39, Mass.

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Contra-Angles

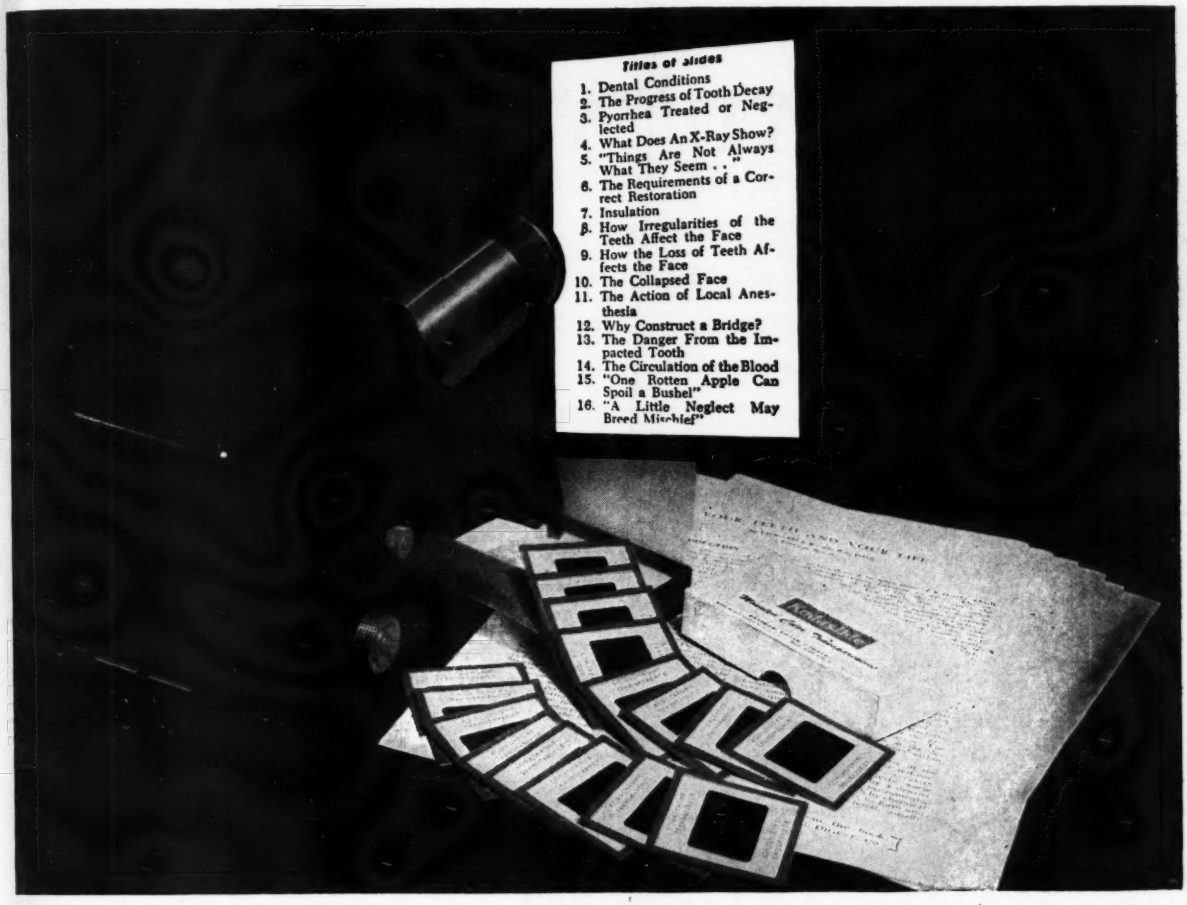
No Cancer for the Happy Soul

A British surgeon of international eminence (Sir Heneage Ogilvie of Guy's Hospital) has said: "The happy man never gets cancer." That is a strong statement and one that will be disputed by other clinicians of experience. Some will say that this is carrying the theory of psychosomatics a bit too far.

There is certainly an inseparableness of the mind and body. There is a constant flow from the psyche to the soma and from the soma to the psyche. What these energies are no man knows. They are thought to be electro-chemical, but the mechanism that triggers the release of electric currents or chemical messages throughout the body has never been discovered. It is the secret of life and may always remain unknown. There are "incomprehensible judgments and unsearchable ways" that it is not for man to know.

Sir Heneage is fearless in the expression of his theory and expects his trial balloon to be shot at by scientists. Here is what he has written:

"A dispassionate assessment would suggest that the normal spell of useful life in Homo europeanus ceases at 48 years. At this age the reproductive power of the female ceases, and that of the male starts to wane; the vascular system shows increasing inability to cope with the varying demands made upon it; the special sense organs develop defects that must be remedied by artificial aids; the respiratory epithelium tires in its ceaseless war against inhaled bacteria; the brain can no longer acquire new skills or deal with unwonted problems; the individual as a whole passes from the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7. Insulation
8. How Irregularities of the Teeth Affect the Face
9. How the Loss of Teeth Affects the Face
10. The Collapsed Face
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class of the workers and fighters to that of the drones.

"At 48, the individual cell groups tend to lose their corporate loyalty, to increase their numbers without any social need, and to make demands for nourishment which their neighbors cannot satisfy. The question 'why do so many of us get cancer after the age of 48' has proved entirely sterile as a guiding principle in research. It is surely time that we posed and faced the real problem. 'We all have cancer at 48. What is the force that keeps it in check in the great majority of us?'

"When I say that we all have cancer at 48, I mean that when he have reached that age some part of the epithelium covering our internal or external surfaces—the skin, the bronchi, the breast, the esophagus, the stomach, the colon, the cervix uteri, the bladder, the prostate—has started in places to show those local reactions that we call 'cancer in situ.' A patch of cancer in situ may remain in situ for twenty years, a pathologist's headache, but no trouble to the possessor. On the other hand it may suddenly develop invasive characteristics and become a frankly malignant tumor. What keeps it in check? What starts its Gadarene progress?

"Like most general surgeons, I have treated and watched many cases of cancer. Some were relatives; many were friends; others, coming as patients, died my friends. I have slowly come to frame in my mind an aphorism that can never be stated as such, because no statistics can be advanced to support it: 'The happy man never gets cancer.' I have caught myself thinking about a colleague 'So and so has started to look unhappy. He is either unhappy because he has got cancer, or he is going to get cancer because he is unhappy.' So run my thoughts and I try to dismiss them. Then I notice that he is missing from the next council meeting. Three months later I read his obituary in the *British Medical Journal.*

"The instances where the first recognizable onset of cancer has followed almost immediately on some disaster, a bereavement, the break-

up of a relationship, a financial crisis, or an accident, are so numerous that they suggest that some controlling force that has hitherto kept this outbreak of cell communism in check has been removed. The late appearance of secondaries, suggesting that over the years some undetected cancer cells have been lying latent and kept in check by some unknown restraining force, is a commonplace after operations for cancer of the breast. Very often—indeed, so often as to suggest that if the true cause could be discovered the problem of cancer treatment might be solved— the signal for renewed growth seems to have been some unhappy event . . . .

"In suggesting that a happy man is captain of his cells and master of his fate, and that he is thereby immune from certain diseases, I am sending up a provocative balloon that any real scientist could shoot down. Further, the word 'happiness' does not adequately describe the mood that I am striving to express.

"Happiness is a poor term for the state of spiritual ebullience that ensures happy government of the republic by the body, that repels the stress diseases, that can keep even cancer in check. Happiness is a pallid emotion. The word suggests groups of worthy people, too meek to have any vices, sitting on clouds and twanging harps. The emotion I wish to describe has no name, but the Greek word 'euphoria' and the modern slang 'oneupmanship' come near to it. It implies complete and rumbustious confidence, a jingoistic joy that is prepared for any trouble, perhaps hoping for it in the secure confidence that the conflict, should it come, will end in victory. It is the spirit that sustained Winston Churchill through the darkest days of the war, and that communicated itself to millions of his countrymen."

How are Your Business Manners?

The about-face that we often observe when a person shifts his role from buyer to seller is something that fascinates me. The seller is usually cordial and effusive with good-will. The same chap when he shifts his gears and becomes a buyer is often rude and ill mannered. I observed this quick shift in personality in a proprietor of a men's furnishing store where I stopped to make an inconsequential purchase.

When I stepped inside the door of the little shop I was a prospect for something more than a pair of shoelaces. The proprietor saw his opportunity and poured affability upon me as he showed me things in stock. I was quite impressed with the charm until he answered the telephone. Although I had no more than the ordinary desire to put my ear to eavesdropping, I gathered that the man on the other end of the line was making some kind of sales pitch. The proprietor left me unattended in the underwear division as he changed his personality to resist the seller on the other end of the telephone. The men's apparel suavity gave way to shrill bargaining and tonal rudeness. I regret that I was unable to catch the word-by-word conversation. I was required to make my deduction on the basis of dark scowls on the face of

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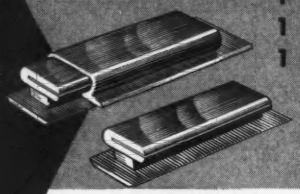

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the proprietor and on his shrill vocal mannerisms. What I saw and heard I did not like.

If anyone could switch his personality so abruptly when he changed from one business role to another would he be entirely sincere in either one? I felt uneasy in the quality of the proprietor's character and decided that my minor purchases would end this short business relationship. My doubts were also raised concerning the quality of the merchandise.

This little shopkeeper is not the only one who commits offenses against decent manners. Some of the giant corporations are as bad.

When you write to a big company to express an interest in a product, or appear as even a remote prospect, you may expect to be flooded with genial voices, pleasant salespersons, or swamped with chummy mail. You may, in fact, receive the triple-threat treatment and have all these responses. Nothing is too good for the fellow who is about to spend his money. When you turn the table and take on the role of seller you may expect a reaction not so gay and cordial. When you write to one of the corporate giants to inquire if they would like to buy something from you, be prepared for the long-drawn chill of silence. If you receive a reply it will likely be curt to the point of offense.

Some of my friends who are "in sales" tell me that many of the corporations that make such a splurge in public relations and pander for public good-will are the most obnoxious when they are in the market as buyers. I would believe that.

I am sorry to report that I have encountered the same disparity in manners among my colleagues in the dental profession. When some of our dentists are wooing (and I mean no offense by this word) a patient they are as devastating as Charles Boyer with their charms. But let a salesman come to call and the charm may dissolve in a flash and the boorish badge of discourtesy take its place. All this shift of personality may occur in an instant. It is the turn-off, turn-on, kind of phony charm.

We all have something to sell and we all are required to buy. Why can't we exercise the same kind of manners in either role? I have regard for the person who is basically ornery and never steps out of character merely to make a sale. I would call him an honorable and consistent man. I have several such friends and trust them completely. Not so for the person who switches his manners to improve his cash position. He is not to be trusted too far.

—E. J. R.

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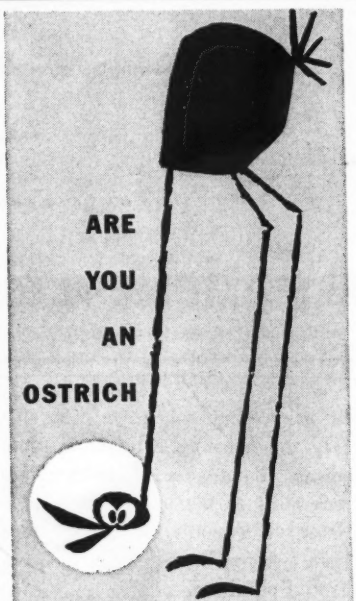

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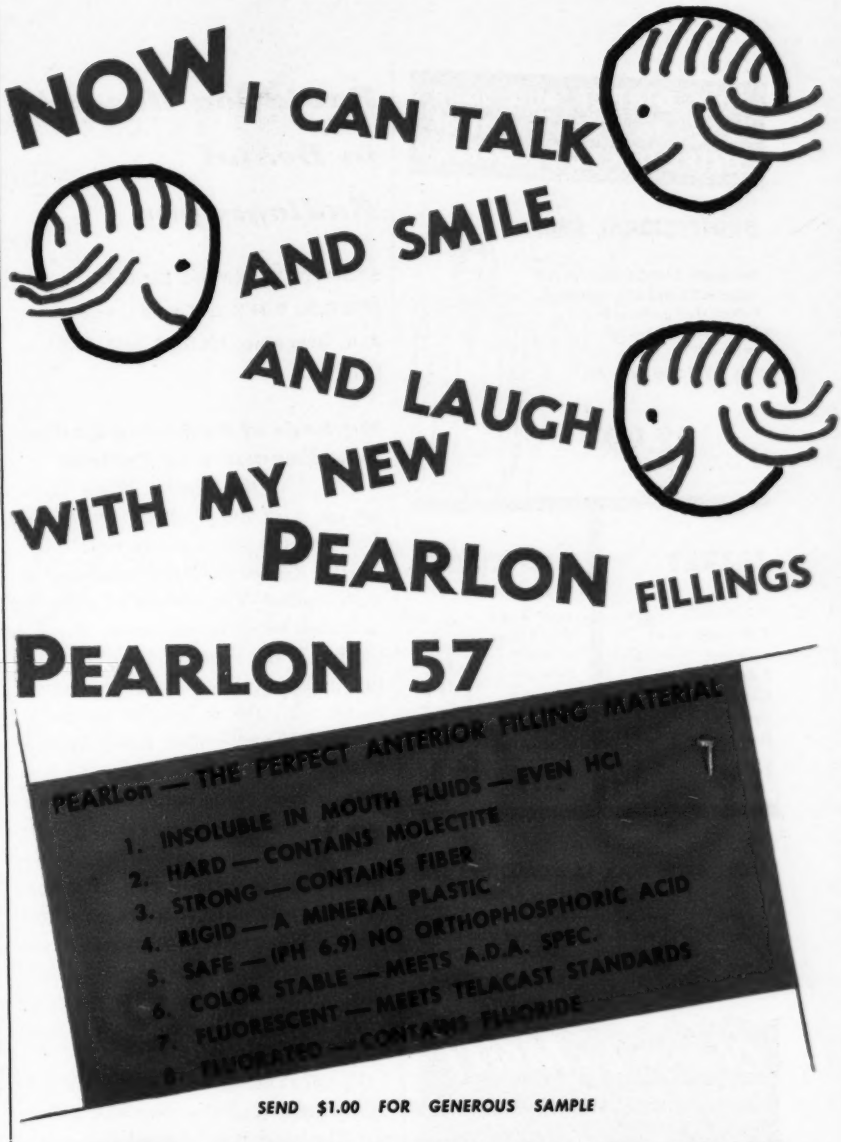
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Radiation Hazards in Dental Radiography

SYDNEY BLACKMAN, L.R.C.P., M.R.C.S., D.M.R.E. (Camb.), and J. R. Greening, Ph.D., F. Inst. P., London

Methods of Reducing Radiation Exposure of Patient

(A) *Use the Fastest Films Compatible with the Detail Required* — This reduces the exposure time.

(B) *Reduce the Area Irradiated to a Minimum*—The amount of primary radiation is proportional to the intensity of the x-rays delivered, while the amount of secondary radiation varies with the volume of tissue irradiated. The smaller the field, the less the stray radiation and the less volume dose to the patient from both primary and secondary rays.

Method to Limit Use of X-ray Beam: By the introduction of a lead or other restricting diaphragm at the outlet of the tube head, the size of the emanating x-ray beam can be limited, and the rays confined to the minimum necessary area on the skin surface of the patient.

Use of Protective Cylinder: Instead of the pointed plastic cone attached to the tube head, it is believed that some advantage might be gained in accuracy of positioning and in reduction of radiation by the use of a narrow protective cylinder. This would not only have the effect of confining the beam within the required diameter, but would also reduce scattered radiation from the plastic cone itself.

(C) *Ensure that as Much of the Radiation as Possible is Radiographically Useful* — This is achieved by using the highest kilovolt that gives adequate contrast, inserting an aluminum filter in the beam to absorb its least penetrating components, which are largely absorbed in the skin.

(D) *Use Long Focus-skin Distances*—This is to ensure that x-ray intensities on the patient's skin and at the film do not have too large a ratio. In dental radiography it is recommended to adopt a focus-skin distance of not less than 8 inches. X-ray units which employ both extremely low voltage and extremely short focus-skin distances, should be deprecated as producing greater patient dose per film.

(E) *Protect Critical Tissues with Some X-ray Absorbing Material*—In view of the large amount of lymphatic tissue in the region of the neck, which is most sensitive to radiation, the use of a shield or bib of lead rubber to protect the patient's neck from secondary radiation should be considered. Similarly, the eyes should be shielded with lead goggles.

(F) *Reduce the Number of Exposures to a Minimum* — Repetitive and control radiographs should be limited to absolute necessity.

Adapted from Original Communications, *British Dental Journal* **102**:169 (March 5) 1957.

Research in Dental Caries*

REIDAR F. SOGNNAES, D.M.D., Ph.D., Boston

Summary

The latest information gained from the study of tooth decay in laboratory animals: Syrian hamsters, Norway rats, Mexican cotton rats, and Indian rhesus monkeys, has been investigated.

Complex Process

It has been demonstrated that the carious process is a complex one in which at least half a dozen factors have been brought to light as being of direct and indirect influence on the carious process: genetic, nutritional, dietary, salivary, endocrine, and bacterial.

Initiative Factors in Caries—Careful experimentation in laboratory animals has offered more precise evidence that the presence of oral microorganisms and certain food sub-

*From the Research Laboratories, Harvard School of Dental Medicine.

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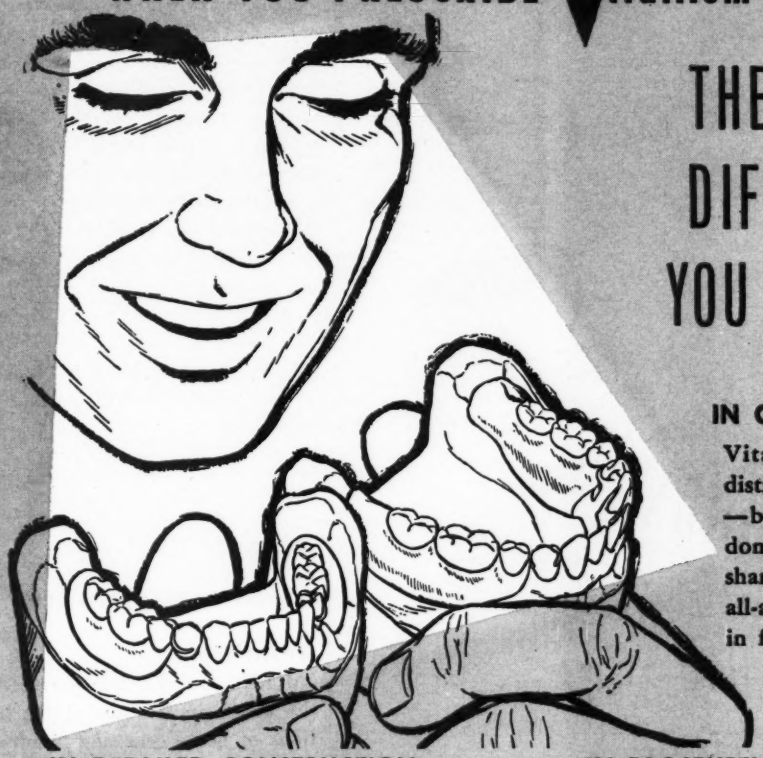

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strates, especially carbohydrates, is essential for the initiation of dental caries.

Important Role of Saliva—Recent study has conclusively demonstrated the importance of the saliva in relation to caries. Particularly, it appears that a normal salivary environment during the initial period of tooth eruption has an important bearing upon the future susceptibility to caries, possibly through an influence on maturation of the teeth.

Modification of Susceptibility

It is noteworthy also that recent investigations have in part interpreted hormonal factors as acting through an indirect effect upon the salivary function. In addition to these oral conditions, it is becoming increasingly evident that the susceptibility to decay can be significantly modified, depending upon the earlier history of the animals.

Genetic Background—Several laboratories have raised certain strains of animals that are extremely resistant and susceptible, depending on the genetic background, even though the same food is fed to the animals.

Significance of Early Dietary History—Furthermore, the early dietary history of the animals, before the teeth erupt, significantly influences the subsequent susceptibility to caries. In this connection, recent observations suggest that various trace elements in addition to fluoride that may not be essential for general health and reproduction may play an important part in the formation and calcification of teeth that are highly resistant to caries.

Adapted from *New England Journal of Medicine* **256**:1229 (June 27) 1957.

Mind

STANLEY COBB, M.D., Boston

Definition

"Mind" is an abstraction denoting the active integration of the billions of nerve cells and hundreds of nuclei of the living brain. It depends for its normal function upon the homeostatic mechanisms of the whole body. The brain is continually passing nerve impulses from one group of nerve cells to another. These are messages. At lower levels they have to do with more simple functions like breathing, digestion and locomotion. At higher levels they reach an incomprehensible complexity and deal with symbols, concepts, and memories. But the principle is the same as at the lower, more reflex level; sensory stimuli arouse stored conditioned responses, memories are brought in, symbols are constructed, and the whole communication mechanism is channeled to a motor outlet to cause behavior.

From Editorial, *Psychosomatic Medicine* **19**:177 (May-June) 1957.